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ARCHIVES OF MEDICINE

A BI-MONTHLY JOURNAL

EDITED BY
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THOMAS A. McBRIDE, M.D., MATTHEW D. MANN, M.D.,

AND

LEWIS A. STIMSON, M.D.

S'il est possible de perfectionner l'espèce
humaine, c'est dans la médecine qu'il faut
en chercher les moyens.

—DESCARTES

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ARCHIVES OF MEDICINE.

Original Articles.

A NEW METHOD OF REMOVING INTERSTITIAL AND SUBMUCOUS FIBROIDS OF THE UTERUS:

ILLUSTRATED BY CASES.*

By T. GAILLARD THOMAS, M. D.

PROFESSOR OF OBSTETRICS AND THE DISEASES OF WOMEN AND CHILDREN IN
THE COLLEGE OF PHYSICIANS AND SURGEONS, NEW YORK.

THE gynecologist of to-day in recognizing the important advances in his department, signalized by the discovery of ovariectomy, the cure of vesico-vaginal fistula and reparative operations upon the perineum, the uterus and the vaginal walls, often forgets how much has been done in reference to the extirpation of uterine fibroids of all three varieties. Prior to the present century, and even during the first half of it, the operation of laparotomy for sub-peritoneal tumors of this class was unknown; interstitial tumors were uninterfered with; and he who studies the methods of those who attacked submucous growths by the constricting ligature, will at once appreciate how hazardous, difficult and uncertain were the means at the disposal of the surgeon of the olden time for dealing with them.

The methods of treating sub-peritoneal tumors do not concern the present inquiry, which is limited to the consideration of the surgical procedures most applicable to the removal of those of interstitial and submucous varieties.

* Read before the N. Y. Academy of Medicine, Jan. 30th, 1879.

The key-note to the modern advance in this subject was struck by the late Dr. W. S. Atlee, of Philadelphia, when in the year 1853 he presented to the American Medical Association an essay entitled, "The Surgical Treatment of Certain Fibrous Tumors of the Uterus heretofore considered beyond the resources of Art." This essay received the prize of the association, and to-day stands as the pioneer article in the surgical literature of these grave and often irremediable cases.

Both in this country and in Europe the lead of this bold surgeon has been followed, and the methods which he advocated a quarter of a century ago, and which slowly battled with a pretty decided opposition, have come to be recognized as legitimate surgical resources.

The views of Atlee, as published in 1853, may be epitomized in these three propositions:

First—If a non-pediculated tumor cannot, from the nature of its attachment and envelopes, be expelled or drawn by mechanical means through a dilated os uteri, it is advisable to make by the knife a means of escape for it into the uterine cavity, through its capsule or enveloping tissues.

Second—If the tumor thus offered an outlet, cannot be removed, it should be forced into and out of the uterine cavity by persistent use of ergot and cutting the cervix.

Third—The tumor, once coming within reach, it should as soon as practicable be enucleated and removed by the surgeon.

That this method of treating such cases is attended by the great dangers of septicæmia, peritonitis, hemorrhage and exhaustion, is not to be denied. But it must be borne in mind that while heroic interference is environed by risks, a Fabian course, a policy of watching, waiting and inactivity is by no means always a safe one. The growing tumor creates exhausting hemorrhages, dangerous mental

depression and anxiety, and disturbance of the functions of nutrition and excretion, which slowly drag the patient down to death. Interference should not be practised unless impending danger urges a resort to it. Cases selected by this rule commonly end in recovery, while non-interference commonly results in death.

The dangers attending strangulation of a uterine tumor by a constricting ligature are now recognized as of so grave a character as to render every cautious surgeon averse to the employment of this method, and although the boldness of the plans recommended by Atlee may appall the timid practitioner, it is now pretty generally appreciated that in apparent temerity there is a degree of safety not to be found in measures which are ostensibly milder and safer.

The plans now usually adopted for the extirpation of submucous and interstitial fibroids may thus be summarized—

- 1st — Excision.
- 2d — Torsion.
- 3d — Avulsion.
- 4th— Ecrasement.
- 5th— Enucleation.
- 6th— The production of sloughing.

Although these methods are, as I have stated, far in advance of strangulation by ligature, to all of them serious objections and deficiencies attach. Excision, from the fact that it is, except in the case of pediculated growths, difficult to reach the point of uterine attachment by knife, scissors or polyp tome, is often impracticable. Torsion can be applied only to pediculated tumors. Avulsion and enucleation are difficult of accomplishment, slow of performance, and so exhausting to the patient that she is in danger of sinking in consequence. Ecrasement frequently fails to remove the entire growth, and leaves the uterine attachment to

decompose and cause septicæmia. And the removal of uterine tumors by the establishment of the process of sloughing, insures so certainly the great dangers of septic poisoning, that this method should, in view of the fact that much safer ones are at our disposal, be now regarded as unwarrantable. Instead of the occurrence of sloughing being courted by the surgeon, it should in these cases be feared, and avoided by all the means by which he can oppose its development. One of the great objections to the use of ergot as a means of causing the enucleation or expulsion of large submucous growths is the tendency of the compressing influence of the uterine fibres to impair the nutrition of the neoplasm so completely as to produce its death and decomposition. This fact, and others which are here mentioned, will be fully illustrated by cases which will hereafter be related in this essay.

The object of this paper is to offer a plan which experience leads me to regard as superior to any of these and which I believe will supersede them with all who are willing to give it a fair trial. This method consists in seizing the tumor at its most dependent and accessible point with strong vulsellum forceps, passing up along its sides the spoon-saw or serrated scoop depicted in Fig. 1, and by a gentle, pendulum motion from side to side sawing through the attachments of the tumor and freeing it entirely from its connections with the uterus.

THE SPOON-SAW OR SERRATED SCOOP.—This instrument consists of a steel spoon with a strong handle, twelve or thirteen inches long. The spoon itself is slightly convex upon its outer, and concave upon its inner surface, while its borders are serrated. The saw teeth are blunt and not slanted in either direction, but perpendicular. The outer convex surface protects the uterine wall entirely, while the inner and concave causes the instrument to hug

the tumor and run along its surface as it cuts its way laterally and upwards.

The advantages which experience teaches me attach to this instrument are the following: 1st, the attachments of the tumor are separated by a saw, which greatly limits hemorrhage; 2nd, the shape of the spoon, convex without and concave within, causes it to follow of itself the contour of the tumor unless this be very lobulated, and protect the enveloping uterine tissues from injury; 3d, the highest points of attachment of the tumor are as readily reached as the lowest, the freed growth descending under traction as the saw severs its adhesions in successive sweeps around it; 4th, the saw action gives to the process of separation, whether the



FIG. I.

The spoon-saw or serrated scoop.

growth be interstitial or submucous, sessile or pediculated, rapidity and certainty; and 5th and last, though by no means least, the nature of the spoon-saw secures separation of a growth at the highest point of its attachment, leaving no peduncle to decompose.

I think that the surest way open to me for demonstrating the positions which I have assumed will be to report a number of cases operated upon by me by the old methods, to point out the advantages which I would now possess in the use of the spoon-saw in those cases, and then to relate instances in which I have employed it in the removal of similar growths since I have begun to use it.

CASE 1.—Large Fibroid expelled through opening made in its capsule.

Mrs. C., residing at Red Hook, N. Y., æt. forty years,

married thirteen years, the mother of one child eight years of age, called upon me by advice of Dr. Bates, of Rhinebeck, and gave me the following history of her case. Four years ago her menstrual periods had ceased for six months, and she began to think that the menopause or pregnancy had occurred, when suddenly they reappeared. At the same time she was disturbed by noticing that her abdomen was enlarging.

From this time the menstrual discharge became profuse, the health depreciated and the strength greatly diminished. The abdominal enlargement steadily increased meanwhile, and at the time that she applied to me, my note book records it as being "as large as in utero-gestation between the seventh and eighth months."

Upon her visit to me, on the 9th of June, 1875, I found Mrs. C. very pale, thin, weak, and bloodless. The appetite was poor, digestion feeble, pulse rather weak and rapid, and the patient's mind much depressed about her condition.

Physical examination revealed the upper portion of the cervical canal expanded as at the commencement of labor,

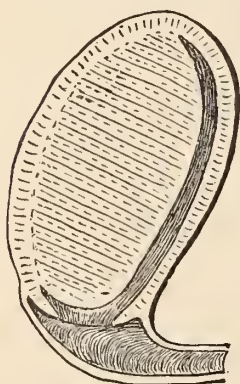


FIG. 2.

the walls of the cervix thin, and a tumor filling the cavity above and firmly attached to the walls of the cervix, except on one side, the anterior. The uterine sound on this side passed up about five inches, but everywhere else the growth was attached all the way down to the lowest portion of the cervical canal. The tumor which presented was rather soft and I suspected that it might be fibro-cystic

instead of purely fibrous. The uterus had, from the history of the case, evidently made determined efforts to

expel the tumor; but, on account of its resisting envelope, had entirely failed in doing more than dilating the os externum.

Figure 2, sketched with pen and ink upon the patient's first visit, will convey an idea of the attachments of the tumor.

The patient being unwilling to remain in town, I decided, *first*—to pass a large aspirating needle into the mass, to ascertain if it contained spaces filled with fluid; *second*—if it did not do so, to make an opening into the capsule which would constitute an artificial os for the mass; *third*—to give ergot steadily to excite expulsive efforts on the part of the uterus to force out the growth.

Accordingly, on the 10th of June, with the assistance of Drs. H. F. Walker, and S. B. Jones, Jr., this course was inaugurated at the patient's hotel, and on the next day she returned to Red Hook without inconvenience.

I did not hear from her until a fortnight afterwards, when she wrote that ever since she had returned home, she had suffered from uterine pains of intermittent character, and had had a slightly bloody flow of a disagreeable odor.

From her attending physician, I subsequently ascertained the progress of the case. The pains referred to steadily forced down the tumor through the opening made in the capsule. It presented exactly as a child's head would have done, and after between two and three weeks of a process closely resembling labor, it distended the perinæum and by very firm traction on his part, was delivered. During this time, a most offensive odor was given forth by the mass, and the patient suffered from a certain degree of septicæmia, but subsequently entirely recovered. Unfortunately the tumor, which was large, decomposed, and almost diffuent, was not weighed.

I neglected to say that the attempt at aspiration yielded no fluid whatever. It is probable, however, that the acu-

puncture resulted in the partial death of the badly organized mass, and aided materially in exciting expulsion.

Three years and a half after the expulsion of this growth I was called to Red Hook to visit a niece of this lady, who likewise suffered from a large uterine fibroid. On this occasion I saw and conversed with Mrs. C., and found her to be perfectly well in every respect.

In some respects this is one of the most remarkable cases that I ever met with. The patient recovered after giving birth to the tumor through the artificial os which I had made in the capsule, but she did so at the infinite risk of her life. By the immediate detachment of this tumor by the spoon-saw, and its removal piece-meal, as I would operate now, the dangers would, I know, be greatly diminished.

CASE 2—Was one which I saw with Dr. Charles Hasbrouck of Bergen, N. J.

Mrs. A., aged forty, married, the mother of four children, had always been in perfect health up to the birth of her last child in 1863. After that time she began to suffer from nervousness and general neuralgic pains, and in 1868-9 these symptoms increased, and menstrual disorders began to show themselves. In 1871 menorrhagia was fully established, and she became very much debilitated by loss of blood. She continued to lose strength and flesh, and in 1873 first noticed an enlargement of the abdomen.

In November of that year I was called to see her by Dr. Hasbrouck, and after a careful examination expressed the opinion that a uterine tumor existed, which was probably a fibroid. But as it was possible, though not at all probable, that it might be one of those cases where pregnancy exists while menstruation continues, I did not think it advisable to use the uterine sound to complete the diagnosis at that time, but rather to wait for six weeks or two months, by which time there could be no doubt as to the existence or non-existence of pregnancy.

I did not see the patient again until February, 1874, when upon examining I measured the uterus with the sound, and found that the cavity was about five inches in depth. I made the diagnosis of submucous fibroid, and advised the use of ergot to diminish the supply of blood to the tumor, and also in the hope that the uterus might be stimulated to contract and expel the growth.

Under the influence of the ergot Mrs. A. soon began to suffer from severe uterine pains, and the os became dilated and filled with the tumor, the presenting part being offensive and gangrenous. Dr. Hasbrouck attempted to remove this, but succeeded in detaching only a small portion. As the patient began to suffer very markedly from exhaustion and septicæmia, it was concluded on March 18th, to remove the tumor at once by enucleation, if possible, and I went to Hackensack for that purpose.

I now avail myself of Dr. Hasbrouck's account of the operation, as reported by him to the District Med. Soc. of Bergen Co., N. J.

"Mrs. A. was placed fully under the influence of ether, and removed to a table in a strong light. Sims' speculum was introduced, when the tumor could be seen filling up the partially dilated os. Dr. Thomas seized it with strong forceps, but it was so putrid as to tear on making traction. After removing as much as possible in this way, the doctor succeeded in passing the loop of an *écraseur* around a part of the remaining undecayed portion of the tumor and removed another large piece, the wire of the *écraseur* breaking during the process. Having thus cleared the os and cervix of a considerable portion of the tumor, he next, partly by the use of an enucleator, and partly by a process of clawing, succeeded in entirely removing the mass, the whole process occupying upwards of an hour.

"Mrs. A. was then carried to bed after the uterus had been

freely washed out with carbolized water, and the effects of the ether allowed to pass off. She vomited several times, pulse frequent and feeble. Brandy and water were given *ad libitum* and a hypodermic injection of morphia gr. ss. was administered.

"March 19, A. M.—Has passed a sleepless night notwithstanding the free use of brandy and morphia. Pulse, ninety-six; temperature, ninety-nine. Loathes food; perspires profusely; feels terribly sore.

"P. M.—Pulse ninety-six; temperature ninety-nine and a half. Treatment—Quinine gr. iij ter in die; beef-tea and milk; morphia hypodermically and by the mouth in sufficient doses to procure rest. Three grains have been taken during the day.

"March 20, A. M.—Pulse ninety; temperature one hundred; discharge slight, and not so offensive as before operation; continued treatment. The uterus is washed out twice a day with carbolized water, by means of elastic catheter introduced quite up to fundus.

"P. M.—Pulse, eighty-five; temperature, ninety-nine and a-half; the discharge becoming more free and offensive, but not as much so as before operation. Rests tolerably well; still sweats profusely in the morning."

Without giving a detailed statement of the farther progress of the case, I will simply state that from this time Mrs. A. progressed favorably. Her profuse sweats gradually ceased; she began to crave food; and the uterus soon subsided so as scarcely to be felt above the pubes. A few shreds of putrid matter were washed away by the injections, but the discharge soon ceased entirely, and in a short time the patient was sitting up, still feeble but apparently well, in much better health, at all events, than for several years past. The tumor, as nearly as could be estimated from the pieces, was about as large as a small cocoanut.

Were an exactly similar case to submit to operation at my hands to-day, by replacing the "process of clawing" alluded to by Dr. Hasbrouck, by the spoon-saw, I am convinced that ten minutes would accomplish with greater ease to myself and increased safety to the patient, all that "upwards of an hour's" work accomplished by the method which I employed in this case.

The next case demonstrates how perfectly removal of a sloughing tumor will sometimes put a stop to commencing blood poisoning.

CASE 3.—Submucous fibroid enucleated during the progress of septic fever. Recovery. Reported by Joseph D. Anway, M. D.; at that time, House Surgeon, Woman's Hospital, New York.

"Mrs. Mary R., æt. forty-five, married twenty years, has had seven children and two abortions, youngest child ten years' old, duration of illness five months; menstruation began when she was fifteen years old, always regular, no pain, amount always great, time always three or four days. The quantity lost has increased very much during the last two or three years.

"Physical examination.—Uterus is considerably enlarged. The sound passes to the left and backward five and three-fourth inches, seeming to mount up over something situated in the posterior wall.

"Diagnosis.—Submucous fibroid situated in posterior wall, retroflexion. Treatment — Hot vaginal baths; Squibb's fluid extract of ergot, half drachm twice daily. The uterus was put in the position of anteversion, and a Cutter's retroversion pessary, with large bulb, was introduced. December 21st, uterus contracting; patient says she has bearing down pains after each dose of the ergot, which last four or five hours.

"January 6—Has just finished menstruating, This time

the flow lasted eight days, and the quantity lost was much larger than at any time previous. The ergot was increased to one drachm three times a day.

"February 10.—Patient has again menstruated. The time was three days, and the amount the same.

"February 24.—She has gained strength; appears much better in every way; uterus very hard. She is to remain in the hospital two weeks longer, and if there is then no change in the position of the tumor, she is to go home and continue the use of the ergot as she has done here.

"March 8.—Patient has had several quite severe chills during the last four or five days, followed by fever and sweating. On examination, the os was found dilated so as to admit two fingers, and the growth presenting, which had already begun to slough, and the patient was showing some signs of blood poisoning; temperature $103\frac{1}{2}^{\circ}$

"March 9.—The patient under ether; the cervix was divided on both sides by Dr. Thomas, the growth seized by strong forceps and traction made. At the same time the tumor was enucleated by the finger and scissors, and removed.

"The patient was then put to bed, and ordered thorough washing out of the uterus every five hours.

"March 11, A. M.—Patient doing well; has not had a bad symptom since the operation. The discharge is quite copious, and has a very bad odor. None of it is allowed to remain for any length of time within the uterine cavity. Her appetite is much improved, and she is gaining generally.

"March 22.—Very little discharge; uterus now measures three inches in depth.

"April 8.—Patient says she feels perfectly well. Uterus now measures two and three-quarter inches. Was to-day discharged."

For the report of the fourth case I am indebted to Dr. Stephen W. Roof, of New York, with whom I attended it in consultation.

CASE 4.—Submucous fibroid removed by enucleation. Recovery.

“Mrs. S——, aged forty years, married, has borne three children, the youngest fourteen years old. Has been in ill health for the past two years, complaining of neuralgic pain in head and face; aching, dragging in the back, pelvis and lower limbs; loss of appetite, vomiting, dysmenorrhœa, menorrhagia and metrorrhagia.

“Vaginal touch and bi-manual palpation showed the uterus to be greatly anteverted, considerably enlarged, and quite tender on pressure. Suspecting an intra-uterine growth, I introduced sponge tents, and after dilating the cervix so as to admit the finger, could feel the lower portion of a hard, firm, rounded mass which was firmly attached to the posterior and right side of the uterine wall, above the os internum. The diagnosis of submucous fibroid was made, and as the patient was not suffering very severely at the time; and as there had not been any dangerous hemorrhage, I did not deem an immediate operation justifiable. I accordingly advised the warm water douche to be used several times a day to soften the cervix and render it more yielding, together with the internal administration of ergot, hoping to force the tumor through the external os, and then remove it by *écrasement*. With this view I gave one drachm of fluid extract of ergot, which acted promptly, but so energetically that I was obliged to control the excessive pain by hypodermic injection of morphia.

“Shortly after this, my patient had a very severe attack of facial neuralgia, with vomiting, which lasted two days, and prostrated her very much indeed. At this time Dr. T. G. Thomas saw her at my request, and after careful examina-

tion, fully concurred in the diagnosis, and advised a continuance of the treatment above mentioned, but the ergot to be given in smaller doses, and as soon as possible the tumor to be drawn down and removed.

"The ergot was given in twenty minim doses every two hours for four days, but as she was evidently becoming more and more prostrated, Dr. Thomas again saw her, and an immediate operation was decided upon.

"On the morning of May 26th, the lady being thoroughly anæsthetized, was laid upon her left side, and the perineum elevated with a Sims' speculum. The os was about three-fourths of an inch in diameter, in which the tumor presented. The tenaculum was firmly hooked into the anterior lip and the uterus drawn down. The cervix was then divided on each side up to the vaginal insertion; the tumor was seized with the vulsellum forceps and an attempt made to draw it out of the uterus and encircle it with the wire rope of Braxton Hicks. Failing in this, a pair of fenestrated forceps were introduced, and a miniature instrumental delivery of the mass attempted, but so extensive was the attachment, that no progress could be made. It soon became evident that enucleation was the only means by which the tumor could be removed, and this difficult procedure was done by Dr. Thomas, in the following manner:

"The mass being firmly held by the vulsellum forceps, a pair of scissors curved on the flat were introduced, and the capsule divided, then portions of the mass were peeled from their bed in the uterine wall by the fingers, and cut away with curved scissors. The operation lasted one hour, and the mass, when removed, weighed four ounces. The hemorrhage was trifling, but the shock severe, and continued three hours before reaction was fully established.

"Intra-uterine injections of carbolic acid, one drachm to a

quart of water, were ordered every twelve hours, and were carried up to the fundus in the following manner: A hard rubber nozzle of a posterior nasal syringe, about the size of a lead-pencil, was warmed in the flame of an alcohol lamp, and its shape altered so as to correspond to the axes of the uterus and vagina, this was attached by a piece of rubber tubing to the nozzle of a Davidson's syringe, through which the injections were safely and thoroughly made. The external genitals were covered with a mass of cotton batting, which had been soaked in a strong solution of carbolic acid and afterwards dried; and quinine given in doses of six grains morning and evening.

"On the morning following the operation, the patient's pulse was one hundred and twenty, temperature ninety-nine, respiration twenty-four; had passed no urine since the operation. The catheter was introduced and the urine drawn, after which the intra-uterine injection was given. This was followed, in half an hour, by a violent chill which lasted an hour and a-half, followed by slight febrile reaction and profuse perspiration lasting through the night. At half-past six this evening, my notes show temperature one hundred and one and one-quarter, pulse one hundred and forty-six. The chill was successfully combated with hot bottles to feet and back, and a glass of hot spiced rum punch, with eight grains of quinine. From this time the quinine has been continued in eight grain doses every twelve hours, the intra-uterine injections made morning and evening, and she has steadily improved without a single untoward symptom."

In this report Dr. Roof says: "The operation lasted one hour and the mass, when removed, weighed four ounces. The hemorrhage was trifling, but the shock severe, and continued three hours before reaction was fully established." By the plan which I am now proposing I feel confident that

the operation would not have lasted over eight or ten minutes, and my impression is that the shock would have been proportionately lessened in severity and duration.

CASE 5.—The late Professor Samuel B. St. John sent to me Mrs. L., a resident of New Canaan, Ct., for supposed rapidly advancing uterine cancer. Her previous history had been one of constant and severe hemorrhages until six weeks before I saw her when a most offensive sanious discharge showed itself, which settled the question of diagnosis.

Upon examination I found that the uterus was occupied by a fibrous tumor almost cylindrical in shape, about the size of a goose's egg, and having a sessile attachment at the fundus. The following diagram depicts the state of affairs:

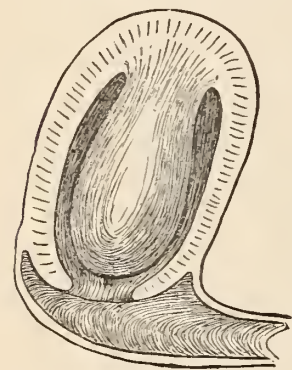


FIG. 3.

This mass was sloughing at its lower extremity and thus the symptoms of cancer were developed. Seizing it with a strong vulsellum, and dragging it down with considerable difficulty, I passed the *écraseur* up as far as I could and cut it off. But I found that in spite of all my efforts, the highest point had not been reached, and that at least one-fourth of the tumor remained, which I could not remove. That night the patient had a profuse hemorrhage, but from this she rallied. After four or five days however, septicæmia developed itself, and to this she succumbed.

CASE 6.—Mrs. S. J. applied to me on account of profuse menorrhagia, which had lasted for several years and greatly enfeebled her. Upon examination I found the uterus considerably enlarged, and proposed dilation of the cervix to ascertain whether a submucous fibroid existed in utero. She informed me that this would be unnecessary, as her

physicians had always been able to touch a tumor within the uterus, whenever she had the expulsive pains which always accompanied menstruation. I awaited this time, and I found that I could then easily touch a hard, smooth tumor through the dilated os, which I estimated as being as large as a hen's egg. It appeared to have just the shape of the tumor described in Fig. 3, Case five. With a good deal of effort, I encircled this with the wire rope *écraseur*, but could not keep the constricting wire at the point of junction of the tumor with the uterus. About two-thirds of the growth were removed, and the remaining third could not be obtained.

The patient made a good recovery and was much improved by the operation, but she has never recovered completely.

CASE 7.—This case I saw with Dr. C. H. Giberson of Brooklyn, and I am indebted to him for the history of it, which I here give in full, because it so well typifies the dangers and difficulties of such cases.

"Mrs. M., aged 34, married, born in the United States, of nervous temperament and spare habit, the mother of five children, of whom the youngest is two and a-half years.

"She had always been in good health up to about a year since, when increased menstrual flow began, gradually growing worse. Her general health suffered, and the metrorrhagia became so excessive, that during the past summer in the country, flooding was present seven weeks out of ten.

"Early in September, 1871, I was consulted about the case, and on the 18th of the same month, made a vaginal examination. The uterus could be distinctly felt above the pubes; it appeared regular in contour, though unusually large, and was somewhat tender on manipulation. It seemed anteverted, cervix was large, elastic, and congested, lips eroded, external os sufficiently open to admit end of finger, whilst the inner

was about normal, canal of cervix and body measured three and a-half inches. An indurated tender spot was observed to the left of the uterus and distinct from it, apparently in the broad ligaments. She complained of darting pains through it. These pains and the tenderness were always relieved by hemorrhages. The week following this vaginal examination her menses appeared, and in spite of absolute rest in bed, with the employment of local and general treatment, a profuse flow continued ten days.

“Sixteen days later, flooding came on more violently than ever before. Styptics in the uterine cavity, the cervix constantly plugged, and vagina firmly tamponed, only checked without controlling the hemorrhage, which lasted thirteen days.

“November 4th.—Seven weeks after the first examination, owing to the excessive bleeding and increasing size of the uterus, some abnormal growth was suspected within its cavity. Yet the internal os was not more open than in its healthy condition. The organ was anteverted, and had a depth of four inches.

“November 8th.—With cervix dilated, quite a large intra-uterine growth was detected with the sound, firmly attached to the wall of the body.

“November 12th.—Dr. T. G. Thomas saw the case in consultation, and diagnosed fibrous polypus attached high up near the fundus. He recommended an improvement of her general health before any operation for removal should be attempted. He also advised the tampon, with astringents locally, as probably the best means for controlling hemorrhage.

“December 5th.—She has been flowing twenty-one days in spite of our best efforts to arrest it, and her danger is imminent. After consulting with Dr. James K. Macgregor, of Yorkville, who rendered valuable aid throughout the pro-

gress of the case, it was thought best to have the operation performed as soon as possible. Dr. Thomas was communicated with, and coinciding with our views, was invited to perform it.

“December 6th.—The cervix thoroughly dilated and patient under ether, Drs. Thomas and Macgregor present, a more thorough examination was made. The growth could be distinctly felt, firm and smooth, strongly attached by a broad base to the posterior wall from a point just within the cavity of the body up as far as the finger could reach. It was found to be a sessile, submucous, fibroid tumor. Two attempts to secure its base within the loop of a strong cord failed. Dr. Thomas then decided upon enucleation as the best means of removal. With blunt curved scissors he cut through the capsule of the tumor at the lowest point of attachment, and with the finger stripped off a portion of the tumor. He then proceeded to break through the firm fibres connecting the growth with the posterior uterine wall. This was an arduous task, requiring a hand in the vagina, with one finger through the dilated cervix slowly tearing away the tough base of attachment, whilst an assistant crowded down and steadied the uterus by firm pressure above the pubis. His hand becoming fatigued, I continued the same process of separation. This was kept up until the growth was held only by a comparatively small particle to the fundus uteri. The over distention of vagina by hand caused some laceration of its mucous lining, and danger of opening the peritoneal sac was apprehended. She had been under ether an hour and twenty minutes, when, owing to these lacerations, the thinness of uterine wall, and especially the great difficulty in reaching the remainder of attachment, it was decided to desist, confident that nature would effect a complete removal of the tumor. Very little blood was lost.

The uterus was thoroughly syringed with a weak, tepid

solution of carbolic acid ; half a grain of morphine injected subcutaneously, and an anodyne suppository placed in the rectum. She rallied quickly and well. Opium was given freely during the first five days after operation. The vagina was syringed every six hours with the above solution, and fomentations kept applied to hypogastrium. The washings gave great comfort, and doubtless served to allay local irritation as well as to lessen the septicæmia. With each syringing fleshy masses and membranous shreds were brought away. No unfavorable symptoms arose. Urine passed without much difficulty. Bowels remained quiet an entire week. No hemorrhage whatever.

“On the fifth day, after a few sharp uterine contractions, the great bulk of tumor had become completely detached, as was anticipated, and protruded from the vulva. It was the size of a large hen’s egg, irregular in shape, with a tough fibrous framework enclosing softer tissues more or less broken down. The microscope showed it to be a true fibroid.

“On the following day, the sixth after operation, a tough thin membrane, evidently the larger portion of the covering of the tumor, was extruded. The progress of case has been satisfactory, and now, the thirty-third day after the operation, she is about the house, has regained some flesh, has almost no discharge, the uterus appears healthy, its depth three inches, position normal, and no hemorrhage has occurred. The regular period for menstruation has passed several days with no indications of its appearance.”

Now it is my firm conviction that were I called upon to deal to-day with the three last cases recorded, I could, by the vulsellum forceps and spoon-saw, remove the entire growth in each case “*cito, tuto, et jucunde.*”

I could cite many other cases illustrative of the difficulties attending removal of fibroids by the old methods, but

these are sufficient. Let me assure the reader that these are not selected on account of the difficulties which attended their extirpation. On the contrary, they are really only average cases in this respect, and are selected merely because they illustrate the difficulties attending the procedures with which I desire to compare the method which I offer as a substitute for them.

The following cases illustrate the removal of interstitial and submucous fibroids by means of the spoon-saw.

Before endeavoring to remove a sessile uterine fibroid, it is always advantageous to learn as much as possible about the degree of its attachment. Not that even universal attachment should prevent the removal of the neoplasm by means of the spoon-saw, but because here as elsewhere "knowledge gives power," and creates confidence. I have after trying various methods of doing this, settled upon the use of the flat, elastic, whalebone sound, which is represented in Fig. 4.

The manner in which I came to employ this, was the following: Going to the country to remove a submucous fibroid, I endeavored by means of Simpson's sound, Sims' probe, and my own round, elastic, whalebone sound to discover the extent of attachment of the growth, but for some reason could not succeed. Taking then a flat piece of whalebone about six inches long, which one of the ladies present removed on the instant from her dress, I put a knob upon it by touching it repeatedly with melted sealing-wax, and I employed this with perfect success. This improvised sound I took

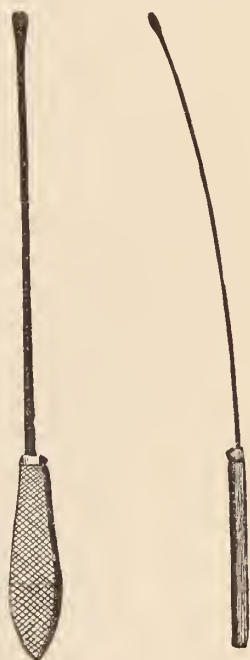


FIG. 4.

away with me, and for a year or more employed it on similar occasions. After that Darrow & Co. made one for me, which is represented in Fig. 4.

This sound is used in this way: The index finger of the left hand is placed on the most accessible part of the tumor; then the sound, held in the right hand, is slid up on one side between the tumor and the uterine wall until arrested, when the index of the left hand is placed upon its shaft at the os externum uteri. The sound being then withdrawn, and the finger kept upon it, it is laid upon a sheet of paper or against a black-board, and being curved, a line is drawn from its tip to the indicating finger. Then the sound is passed on the other side, and a similar transfer of its course is made to the sheet or board.

In this way it is possible not only to approximate the truth, but to be wonderfully exact as to it. I have repeatedly demonstrated the efficiency of this sound to classes of students and to medical men, and I feel sure that it leaves nothing to be desired in reference to the determination of the degree of attachment of any uterine fibroid which can be fully touched by the finger. Without this possibility the method is unreliable.

CASE I.—In June, 1876, I was called by Dr. John Burke of this city, to see with him Mrs. A., a lady forty-seven years of age, the mother of one child aged nineteen years, who had been for four years suffering from a very profuse menorrhagia and metrorrhagia. To such an extent had she been reduced by loss of blood that she was generally confined to her chamber, and suffered from œdema pedum, palpitation of the heart and dyspnœa, upon the slightest exertion. Her appearance was that of one suffering from an exaggerated degree of anæmia, which was rapidly growing worse from repeated and severe hemorrhages. The liver was found to be very much enlarged, as was likewise

the spleen; the former, as we supposed, from fatty degeneration, the latter from malarial poisoning.

Mrs. A. had been examined repeatedly as to the uterine condition during this period, and twelve months before I saw her, Dr. Burke had discovered the existence of a sub-mucous uterine fibroid, supposed to be as large as the egg of a goose. At no time up to June, 1876, did he consider her in a condition fit to admit of an effort at the removal of this, but at that time he called me to decide whether it would not then be possible.

When I first saw her I found the uterus, by conjoined manipulation, as large as it would be in pregnancy at the fourth month, admitting a sound to a distance of five inches, and the tip of the index finger, when force was used, so that a hard, pyriform tumor could be touched in the uterine cavity.

The patient was so much exsanguinated, so much exhausted, and her nervous system so profoundly depressed, that I decided against operation, and she was fully sustained by diet and fresh air, in the hope that a few months would so improve her state as to render operation possible.

I saw her several times after this with Dr. Burke, but instead of getting better, she steadily grew worse, and in September general dropsy set in, affecting the peritoneum and the cellular tissue of the body. We now thought the case decided, and gave up all hope of removal of the uterine growth. In time, however, all the effused fluid disappeared, and about the beginning of January she was so far restored that the question of operation was again agitated. On the 15th interference was decided upon, and on the 28th the tumor was detached and removed.

The following diagram represents the attachments of this tumor:

It was free upon one wall only; attached through-

out the other to within an inch of the os internum.

At midday, on the 28th of January, detachment and extraction were practised in the presence and with the assist-

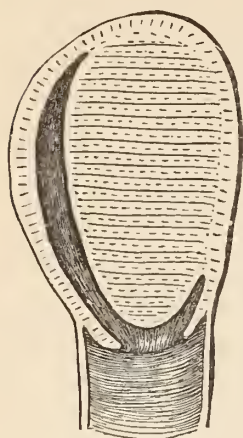


FIG. 5.

ance of Drs. Burke, Walker, and Jones. The patient, being etherized, was placed in Sims' position, and his speculum was introduced. The cervix being then caught with the tenaculum, its lips were severed on each side, so as to open the way to the tumor, which could by the finger be felt above before this was done, but now could be quite freely manipulated. A powerful vulsellum forceps was then firmly fixed in the growth, and securely locked. Then,

with the spoon-saw, the uterine attachments were rapidly and very easily severed.

I was equally surprised and pleased, as were also my assistants, at the rapidity, ease and certainty with which the sawing motion given to this instrument by the right hand separated the tumor from the uterus, even at the fundus. In a very few minutes I had succeeded in detaching and delivering a tumor which by methods which I have heretofore adopted would have taken, I think, at least a half hour. Indeed I must say that I believe that in the enfeebled state of the patient by no other method could it have been removed without great risk of fatal exhaustion.

The tumor weighed seven and a-half ounces, and measured, in its long diameter, four inches, and in its short, three. It resembled in shape and size a large goose-egg, and was composed of the ordinary tissue which characterizes these myomata.

The patient entirely recovered, and is now enjoying good health.

CASE 2.—I assisted Dr. A. C. Post in the removal of a large fibroid in this case at the Presbyterian Hospital about a year ago, and it is introduced here by his permission. The patient was 34 years of age, and had had several abortions, but had never gone to full term. Her prominent symptoms were profuse uterine hemorrhage, leucorrhœa, rectal and vesical tenesmus, with retention of urine and “dragging pains” about back and pelvis.

Upon physical exploration the os externum was found dilated to about the size of a silver half dollar, the uterine cavity measured four and a-half inches, and the posterior lip of the cervix was greatly enlarged and depressed. Through the os could be felt the hard, smooth surface of a fibroid. The impression left upon my mind by a very careful examination of this case upon two occasions will be conveyed by this diagram, which like the rest of course must not be regarded as entirely accurate.

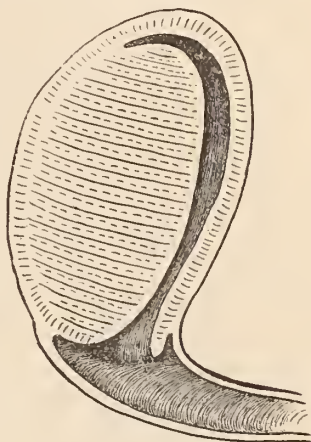


FIG. 6.

Every surgeon at all conversant with such cases will recognize in this one of most formidable character, one which Atlee would have treated by incision, ergot and the influence of “erymacaucis” or putrefaction, and as I did CASE I of the first series which was its counterpart. Dr Post, who very kindly tried the spoon-saw, which was then quite a new instrument, cut through the investing tissue until he could seize the hard, fibrous growth by a strong pair of vulsellum forceps, peeled back the capsule with his finger, and then severing the attachments of the tumor to the uterus by the saw, succeeded in delivering it in forty-five minutes. It weighed exactly seventeen ounces. Although

a sharp hemorrhage followed its removal the patient made an excellent recovery.

Dr. Post expressed himself to me as much indebted to the saw for its removal, but whether he shares my belief that by no other means could this tumor have been removed with a degree of rapidity and completeness compatible with safety, I do not know.

CASE 3.—Mrs. R., a resident of Louisville, Ky., came on to me to be treated for profuse uterine hemorrhages which had lasted for three or four years. Upon examination I found the uterus to be as large as it ordinarily is at the fourth month of gestation and admitting the probe to the depth of four and a-half inches. Upon my expressing the opinion to her that a submucous fibroid existed and proposing to dilate the cervix to make sure of the fact, she assured me that this would not be necessary for she was sure that a hard tumor could be touched inside the womb whenever she menstruated. So positive was she about this that I awaited her next menstruation to decide the question. At that time I found the os dilated, and as she had stated I could distinctly feel a fibrous polypus presenting. By the flat, elastic, whalebone sound I found this to be a sessile growth attached to the posterior wall for about two-thirds of its upper surface and to the anterior wall for a short distance.

Rather than wait and dilate the cervix in an inter-menstrual period I decided to remove the tumor at once. Accordingly Mrs. R. being anæsthetized I cut the rim of the cervix with scissors, seized the tumor with a vulsellum and by means of the spoon-saw rapidly detached and removed the growth.

The patient recovered without an unfavorable symptom, and I received news from her only yesterday to the effect that after the expiration of five months she has almost entirely recovered her health.

CASE 4.—Mrs. X., residing on Staten Island, was seen by me in consultation with Drs. F. E. Martindale and W. C. Walser, when *in extremis* from prolonged and excessive hemorrhage. She was extremely exsanguinated and pallid and the pulse beat steadily at 140 to the minute. We all recognized that operation would in all probability fail to save life, and yet it presented her only chance. All means except extirpation had been used in the effort to check the steady and profuse flow of blood which was sapping her strength, and all had proved unavailing.

We doubted whether she would not die from the process of etherization, but it was regarded as safer to employ it. With the full knowledge of her friends as to the gloominess of the outlook, I proceeded to operate. The tumor was as large as a duck's egg, was as sessile in its attachment as Fig. 7 represents, but could be readily reached through the os which was as large as a half dollar. For any degree of hope to attach to the operation rapidity of execution was absolutely essential. As soon as anæsthesia was complete I seized the tumor with a vulsellum and in a little less than six minutes it was removed.

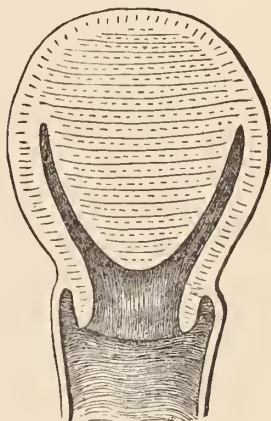


FIG. 7.

No hemorrhage followed and for some days we indulged the hope that the flickering flame of life might be renewed. After that time, however, the patient died very suddenly, and apparently from sheer asthenia.

CASE 5.—This case, one of the most interesting and significant of all which this paper embodies, I saw with Dr. Laurence Johnson, to whom I am indebted for the following history :

Mrs. M. S., born in New York, aged 30, mother of five children, enjoyed excellent health until her fourth confinement in March, 1877, when a small fibrous tumor as large as a hickory-nut was discovered in the posterior wall of the cervix.

In October, 1877, seven months from the discovery of the fibroid, she became pregnant and went on favorably until the 1st of July, 1878, when she consulted Dr. Johnson on account of severe vomiting. On the 10th he examined physically and "found a tumor well nigh filling the pelvic cavity. Its attachment was to the posterior wall of the uterus, while the os could be felt high up behind the symphysis pubis."

Dr. Johnson goes on to say: "Dr. Emil Noeggerath saw her with me on the 11th and as labor seemed imminent, advised to make pressure against the tumor by the use of *Barnes' dilators*, thus flattening it and hastening labor, This plan was put into effect at 2 P.M. and was entirely successful. Strong pains were produced in a few hours, a large bag of waters displaced the dilator, and about 8 A.M., July 12th, she was safely delivered of a small child, which presented by the breech. The babe died in convulsions about 24 hours later."

The pressure of the tumor against the sacral plexus of nerves must have been exceedingly great, for the labor was followed by almost complete paraplegia which existed, in spite of remedies, at the time when I removed the neoplasm, October 1st, 1878.

I operated, the patient being thoroughly etherized, in the presence of Drs. Laurence Johnson, Warren, Walker and Jones.

The tumor was found to be interstitial, imbedded in the posterior wall of the uterus and projecting downwards below the os externum. The following diagram will convey a correct idea of its relation.

The patient being placed upon the left side, Sims' speculum was introduced, and the cervix uteri exposed to view. Seizing the enlarged posterior lip with a tenaculum and dragging it firmly downwards, I cut through the uterine tissue, across the most dependent and accessible part of the tumor, until its white, fibrous structure was seen. Still pulling upon the tenaculum, I now detached the adherent uterine tissue from the tumor by my index finger for a little space, and then seizing the tumor itself with a pair of powerful vulsellum forceps, drew it forcibly down into the opening I had made. Now pulling steadily with the forceps, I inserted between the neoplasm and the uterine tissue the spoon-saw, and by gently swaying its upper serrated extremity from side to side and around the circumference of the growth, easily, rapidly, and almost bloodlessly detached it. In a few minutes, the time seeming surprisingly short to every one, the tumor was drawn forth in the grasp of the forceps.

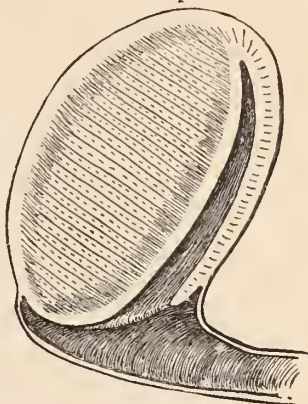


FIG. 8.

The extensive nest left upon its removal was now tamponed with thymolized cotton, which was sustained in position by a vaginal tampon. In twenty-four hours the latter was removed by Dr. Johnson, and in forty-eight the former likewise. After this, the empty nidus of the tumor was thoroughly syringed out with thymolized water, once in every twelve hours. The patient made a good recovery without the development of a bad symptom.

The tumor which weighed eight ounces, measured in its long diameter, four and a-half inches; and in its short three and a-half inches. It was hard, dense and white in structure, presenting several lobulations upon its surface.

In removing this tumor I entertained great fears of passing through the attenuated uterine structure and opening into the peritoneum, and as the growth left its bed I passed in my finger with great solicitude, to ascertain whether such an accident had occurred. I was gratified to find that it had not done so.

It may of course be an illogical deduction, but it is my belief that by any other instrument than that employed, it would have been scarcely possible to have avoided that untoward occurrence.

It is now four months since the operation was performed, and in reply to an inquiry from me, Dr. Johnson says that the patient has steadily improved, though the paralysis has not yet disappeared.

CASE 6.—In this case a patient presented herself for removal of a fibrous polypus almost as large as a hen's egg, which had a pediculated attachment as large as the index finger near the fundus. It was a typical case for the use of the *écraseur* or galvano-caustic wire, and one in which either of those methods would readily have accomplished removal. Indeed it might have been removed by torsion, avulsion or excision. I determined, however, to try the spoon-saw, by preference, to compare its action with that of the means just mentioned.

Fixing the vulsellum forceps in the lowest part of the tumor, I made firm traction upon it so as to put its pedicle upon a stretch. Then passing the saw along its sides until it was arrested, I gently swayed it from side to side using very little force, when in less than two minutes, the tumor escaped through the dilated os with almost no hemorrhage.

I stated that the removal of this fibrous polypus by galvano-cautery, *écrasement*, torsion, avulsion or excision, would have been easy. By the means adopted it was still easier than it would have been by any of the methods mentioned.

I have employed this method in numbers of other cases, and never met with an accident which could be attributed to its use; but the number here recorded is sufficient.

It may be asked whether I am so sanguine as to believe, or so thoroughly convinced as to recommend, that the use of the spoon-saw should supersede all other methods in the removal of submucous and interstitial fibrous tumors. I unhesitatingly answer affirmatively to both questions, and willingly leave the proposed method to the test of experience. In general terms, I would say that in any case in which the vulsellum forceps can be firmly fixed in a fibrous tumor of a size sufficiently small to admit of delivery by the vagina, detachment of it from the uterus can always be accomplished by this method.

I do not say of course, that in doing this, the uterine wall may not be cut through and the peritoneum opened into, but I do declare that no such accident has yet happened in my practice of this means, while it has done so with the *écraseur*. I would go further and assert my firm belief that such an accident is much less likely to occur from the use of this plan, than from that of enucleation as ordinarily practised.

It must be remembered that the use of the saw is not the only means brought into action, strong traction upon the tumor is added to this as an essential adjuvant.

Before concluding, I will avail myself of the opportunity for saying a few words concerning the delivery of very large tumors, which occupy the vagina after expulsion from the uterus. The tumor although susceptible of detachment, is so large as to render its delivery without diminution of size, impossible. In a general way it may be said that any tumor which can be completely accommodated in the pelvis, can be delivered *per vias naturales*, without diminution in bulk. But sometimes a projecting portion of

a tumor may fill the pelvis completely, and a still larger portion may remain above the superior strait, which cannot be drawn through without mutilation.

The plans which I would recommend for the delivery of these large growths, are the three following :

First, the tumor seized by strong vulsella or by the obstetric forceps may be drawn down, the distended perineum severed to the sphincter ani, the uterus partially or completely inverted, the tumor detached by the spoon-saw, the uterus immediately replaced, and the perineal section closed by suture.

Second, the tumor may in successive sections be encircled by the galvano-cautery wire, and piece by piece cut away as was successfully done by Dr. J. Byrne, in a case published in the *American Journal of Obstetrics*.

Third, by a large trocar and canula, the actual cautery or the trephine obstetric perforator, a channel may be made for some distance up the middle of the tumor. Then by strong scissors or by Davis's cranial osteotome, pieces of the growth may be successfully cut away, until the whole mass becomes so diminished in size, that it is susceptible of delivery.

That all of these methods are far more in accordance with good surgery and safe practice, than the less rapid plan of mutilation of the tumor and production of sloughing, I have not the slightest doubt from my observation and experience.

Some of these cases have already appeared in print, but I trust that I may be pardoned for introducing them here as they are cited merely in support of the position which I take in this paper, and a mere reference to them as they appear elsewhere would not answer the purpose.

PROVISIONAL REPORT ON THE EFFECT OF QUININE UPON THE CEREBRAL CIRCULATION.

BY MARY PUTNAM JACOBI, M. D.

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THE use of quinine in certain forms of presumed cerebral hyperæmia, was suggested to me, partly by some clinical experiences of Galezowski of Paris, partly by some physiological experiments of my own.

The first series of the latter has already been published in the *American Journal of Medical Sciences* for last July. They consisted in sphygmographic observations on the brain of a boy, who had been trepanned eighteen months previously for a fracture of the skull. A portion of brain securely covered by membrane remained exposed, and its pulsations could be observed by the eye, and measured by the sphygmograph, as easily as those of any superficial artery. The character of the traces thus obtained, was profoundly modified by the influence of drugs. When twenty grains of quinine had been given to the boy, two hours previous to taking the trace, this was found to show a very marked diminution in the intracranial tensions, and in the resistance offered by the brain to the systole of the heart. After the expansion caused by this systole, the collapse of the cerebral mass was more sudden and extensive, than under any other circumstances. At the same time, the membranes covering

the brain were depressed below the level of the cranial bones. All these circumstances tended to prove that, under the influence of a "sedative" dose of quinine, which in health had lowered the rectal temperature one degree, the amount of blood contained in the brain was diminished.

A new opportunity has recently offered itself to me, for making similar observations on the trepanned brain of a human subject. The case, however, was much less favorable for observation than the first one, for the opening in the skull was much smaller, and the range of excursion of the cerebral pulse much more limited.

It was impossible to apply the levers of a Mahomed's sphygmograph, which had been used in the first case, but by means of the Pond's sphygmograph, traces were obtained, showing, as before, considerable modification under the influence of twenty grains of quinine. It must be confessed however, that these are more difficult to interpret. As compared with a normal cerebral trace from the same subject, the percussion stroke is much lower and more oblique, the systolic apex more rounded and passing tidal wave, while the diastolic elevation rises slightly above the level of the systolic apex.

These characters taken by themselves, would indicate diminished force in the contraction of the heart throwing blood into the brain; and rather an increase in the amount of blood contained in the brain, with consequent increase of intra-cranial tensions.

The radial pulse showed as compared with the normal, a much less marked diminution in the force of the cardiac contraction; whence we must again infer, that the small percussion stroke in the cerebral trace, was due rather to increased resistance offered by the cerebral mass, than to diminished propulsive energy of the heart.

It is possible that the difference between these results, and

those obtained in the first case, is due to the different age of the subjects submitted to the same dose, (20 grs.) the first was a boy of ten, the second a young man of twenty.

The clinical cases in which I have been led to use quinine, are those where a diagnosis had been made of stasis of the cerebral circulation, accompanied by symptoms of general depression, and either no fever, or very moderate fever. In five cases on my notes, some other medication was used in connection with the quinine; and in some of these, the case continued to progress into a fatal meningitis.

The case, which seems to me sufficiently pure, is the following:—

On the 15th of last February, a child, Joseph Johns, æt. 10 months, was brought to me at the dispensary with the following history. He was said to have been taken ill a week previously with high fever and vomiting, and all the next day, “kept working on the right side.” Continued to vomit once each day, retaining however, much of his food, rolled the head from side to side and seemed scarcely conscious, was constipated, though usually subject to diarrhœa. When I saw the child, he was very heavy and drowsy, lying on his back with head retracted, and some little rigidity of the neck. He kept moaning frequently. Temperature in rectum was 101°. The head was hot out of proportion to the rest of the body. The pupils were normal, the face not flushed, the pulse regular, the tongue clean, constipation persisted. There was nothing abnormal in the lungs.

A diagnosis was made of a reflex hyperæmia of the brain, probably initiated by gastro-intestinal irritation. He was ordered a purgative dose of castor oil, and fifteen grains of quinine to be taken in three doses at two hours interval.

On the 16th, child was much better. The retraction and rolling of the head had ceased, as also the vomiting. There had been one passage after the oil; the expression of the face had become natural.

Was ordered five grains of quinine on the 17th. The fifteen grains and the purgative were repeated. On the 18th, child quite recovered. Convalescence remained permanent.

Two comments may be made on this case.

1st. There could not have been, as there was presumed not to be, gastric catarrh at the time of giving quinine, to which the vomiting could be ascribed. It was to be excluded not merely by the clean tongue, but by the success of quinine in arresting the vomiting, when it should have aggravated a gastric catarrh.

2nd. The revival of the child cannot be attributed to a tonic action of quinine on the circulation; for fifteen grains administered in the course of three hours, can act only as a powerful sedative to so young a child. I attribute the effect therefore, to a depletion of the cerebral blood-vessels; brought about partly by the action on the heart, partly by a direct effect on the vessels.

I may here be permitted to refer to the interesting experiments of Cheirone, of Naples, published in the *Gazette Hebdomadaire*, for 1875.

His experiments would show that quinine increases the diastole of the heart. At first, the systole is indirectly increased on this account, hence the increased energy of the cardiac contractions obtained by small doses. With larger doses the diastole altogether predominates, the systole becomes weaker, and the heart is finally arrested in diastole. This increase of the diastole causes an increased aspiration of blood to the heart, and after arrest, it is found by actual measurement to be much enlarged.

Now an increased aspiration towards the heart should exercise a marked influence upon depleting distended veins, both in the brain and in the lungs. The influence of quinine upon pulmonary congestions will hardly be disputed; we might already therefore, be led to look for an analogous

action in hyperæmia of the brain, unless it were here counterbalanced by some other effect peculiar to this organ.

Cheirone does not occupy himself with the question of the brain; but reported some further experiments made to elucidate the action of quinine upon the blood-vessels. The observations were made upon the ear of a rabbit. I have thought it worth while to repeat them in connection with the question of the cerebral circulation, because other experiments with quinine,—as those of Dr. Hammond,—have estimated the effect of the drug upon the brain, exclusively from its observed effect on the tympanum, conjunctiva, and blood-vessels of the face. A young rabbit was taken, white, and with perfectly transparent ears. Before the experiment these ears were pale and cool; no network of vessels was visible between the three main blood-vessels. An acid solution of sulphate of quinine was injected subcutaneously. During the injection, that is when the animal had received about seven centigrams of quinine, there was a sudden dilatation of the aural vessels. The central artery began to pulsate, and the ears became hot. The pupils, which had been widely dilated, contracted, and the respiration was accelerated. The remaining eight centigrams were thrown into the stomach, making fifteen centigrams, or about two and a half grains in all. In half an hour the pulsations of the central artery had ceased; but the general injection of the ears persisted. The pupil remained contracted, and the conjunctiva was somewhat injected.

In one hour the injection of the ears had entirely disappeared. The ears were pale and cool as at first.

New sub-cutaneous injection of seven centigrams. During the injection the ears again began to redden, and in five minutes from the beginning of the injection they were highly hyperæmic. In another minute they paled, even the central artery sensibly contracting, in another minute they

dilated again. These alterations succeeded each other at intervals of a minute for another five minutes. After ten minutes from the completion of the injection, the ears remained pale. Half an hour later, two and-a-half hours from first injection, a third injection was made, this time of fifteen centigrams. The ears did not flush nearly so rapidly as before; not until seven minutes from the completion of the injection. There were one or two alternations of flushing and paleness, but in fifteen minutes the flushing persisted. The central artery then pulsated, but not so strongly as after the first and second injections of seven centigrams each. The ears remained intensely injected an hour later, and two hours after were reported to be unchanged, but of this I am not quite sure. Five hours later, I found them pale and cool. These two last injections produced no noticeable effect on the eyes. After this third experiment, the rabbit had received by injection thirty centigrams of sulphate of quinine, and by ingestion, seven more.

After the third injection he became much quieter, but not really stupified.

These results quite corresponded to those of Cheirone, notably in the fact that the marked dilation of the blood-vessels was the initial phenomenon, and at no time did a contraction take place as by vasor-motor irritation. Another coincidence consisted in the curious rythmic alternations of flushing and paleness, preceding the definite flushing, and which Cheirone also noticed. He calls this diastole of the blood-vessels exactly analogous to the diastole of the heart, and produced by the same mechanism, namely, a direct effect on the ultimate molecules of the muscular fibre.

The results of these experiments finally, entirely agree with those made by Dr. Hammond on himself. It was important to ascertain whether the flushing of the external cranial circulation was accompanied by a similar condition

of that of the brain. Another white rabbit was selected, of exactly the same size and age, and a piece of the parietal bone on the right side, one inch long and half an inch broad, easily removed. Only a single indentation with the pin of the trephine was required; the bone was then easily cut away with scissors and pincers. No ether was given, but the rabbit remained quite quiet, after the trephine pin was removed. The hemorrhage was slight; but so soon as the brain was exposed to the air, its vessels became so much distended with blood, that observations upon their further dilatation would have been impossible. The scalp was therefore drawn together over the exposed brain, and the animal left in quiet till the next morning.

Eighteen hours after the trepanning he was found well and lively, having eaten much cabbage since the operation. The exposed portion of brain was still somewhat hyperæmiated, and protruded slightly; one portion, however, surrounding a central ring of permanently dilated vessels was pale, and could be observed with a magnifying glass.

At 10.30 A. M., a first sub-cutaneous injection of fifteen centigrams of sulphate of quinine, in an acid solution, was given.

At 11, there was no noticeable alteration of the circulation either in the ears or the pia mater of the white exposed surface of the brain. Thus the trepanned rabbit already exhibited a marked difference from the non-operated one in omitting the rapid flushing of the aural circulation, as a first effect of quinine.

Not examined again until 12.45, then the ears were found much injected, but less so than had been the case with the untrepanded rabbit. No perceptible alteration in pia. Thirty centigrams of quinine were sub-cutaneously injected.

1.30, injection of ears persisted. No change of pia.

The exposed brain was then covered by a thin piece of

glass, held in place by the scalp, and the animal left till the next morning.

The next morning the hernia of the brain was found much diminished; but it was so uniformly hyperæmiated that further observation was impossible; the hyperæmia however, though diffused, was much less intense than on preceding day. The rabbit had eaten and seemed perfectly well. Ears pale and cool; the scalp was sewn over the brain. A piece of the parietal bone on the left side was now removed. As before there was immediate hyperæmia, though the brain had not been in the least injured.

It was covered with glass and left for three hours.

At 12.10, the greater part of the exposed surface was still much hyperæmiated, and there was some effusion of blood. One clear space remained, showing under the magnifying glass: First, one rather large vein; second, one fine long artery with two short branches; third, one short artery at right angles to vein; fourth, a small patch of capillary injection. The rest was white. These vessels were thus counted in order, to insure accuracy in comparing their condition with that which might exist after the quinine. I am certain that without such precaution, and the use of the magnifying glass, it is not possible to rely upon observations on the pia mater vessels of the rabbit.

Fifteen centigrams of quinine were injected as before, (12.10).

At 12.30, no change in ears or pia, which had been continuously observed. Second injection of 0.15.

12.55, no change. Animal had seemed somewhat stupefied after injection. Still quiet. Heart beat very softly.

At 1, third injection of 0.15. Animal seemed stupefied, fell flat on his fore-paws. No change in ears or pia during ten minutes.

1.45, found the ears injected for the first time, their central

artery dilated and pulsating strongly. But the pia in the observed territory was unchanged. No general increase in color, and vessels on counting found to be the same.

Rabbit not observed again until three, was then found in an epileptic convulsion, facial muscles on the left side and the left fore-paw being agitated in clonic convulsions. The pupils were dilated, the teeth ground together, the lips retracted. There were no convulsions of the other limbs. The ears had become pale and cool. The convulsions affected the side opposite to that which had been trepanned two days before, and which for six hours had been completely covered by the scalp. It appeared as if a meningitis might be setting in, but on removing the stitches and re-exposing the brain on the right side, it was found to be in quite a normal condition; it had subsided into the cranium, and had lost the injected appearance observed in the morning. There was no trace of commencing meningitis.

On the left side of the brain, the same side as that which was agitated by the convulsions, and which had been exposed the same day, it was noticed that, during the convulsions, the brain protruded, but did not become more injected. The convulsions only lasted from a quarter to half a minute. Immediately afterwards, the brain became depressed, even a little below the level of the cranium, and at the same time began, for the first time since the exposure, to oscillate synchronously with the respiration.

The respiration was markedly accelerated for a few moments after cessation of the convulsions. I attributed the protrusion of the brain to increased congestion during partial arrest of the respiration; the subsequent depression, to increased aspiration of venous blood, at the return of respiration; and the oscillations, to the diminished tension of the brain due to the same venous depletion.

The convulsions were repeated with exactly the same

characters every fifteen minutes during the next hour, and for two hours later, it seemed to be the same. During all this time the pia mater over the observed territory remained unchanged. The rabbit died during the night.

From this double series of experiments, the following conclusions are unavoidable:—

First, quinine in small doses, (7 to 15 centigrams,) causes active dilation of the external cranial circulation in the rabbit.

Second, in larger doses this was more slowly produced, but when produced, was much more persistent.

Third, in a trepanned rabbit, this effect on the ears was much more slowly produced, and only at much larger doses. It then was as persistent as in the non-operated animal.

Fourth, dilatation of the aural blood-vessels may be produced, while those of the pia mater remain absolutely unchanged.

A categorical conclusion cannot be drawn from the convulsions, at least I have not as yet drawn one. But the absence of any new irritation on the right side of the brain, the apparent starting point of the convulsion; the marked diminution of irritation here in fact, at the time of the convulsion, and diminishing irritation on the opposite side, would seem to exclude a traumatic origin to the convulsions.

I ask myself whether the lowered intra-cranial tension observed just after the convulsion, were not really the cause of it; existing before as a consequence of the accumulated effect of larger doses of quinine; which effect was only temporarily effaced during the convulsion?

From this point of view, we should infer that the convulsion was caused by the greater mobility given to the brain, when the effect of lowering of the tension was combined with exposure of the brain to atmospheric pressure.

To these experiments upon rabbits, I might perhaps add the negative result of some experiments made by myself a

year ago upon dogs, with Dr. Hammond's cephalometer. Six experiments were made, of which number I only consider two as satisfactory. In these, the instrument was accurately adjusted to the cranial opening made by the trepan, after removal of the dura mater. Ten grains of quinine in acid solution were then injected sub-cutaneously, and the fluid in the glass tube of the instrument watched uninterruptedly during two hours. Not the least change occurred in its level.

THE AID WHICH MEDICAL DIAGNOSIS RECEIVES FROM RECENT DISCOVERIES IN MICROSCOPY.*

By C. HEITZMANN, M. D.

A FEW months since I had a conversation with a renowned physician of this city, in the presence of an intelligent cloth manufacturer, about the great value of the microscope, especially in the practice of medicine. The physician laughed at me, and asserted the science of microscopy to be good for nothing, because of its low development, its unreliability with regard to new discoveries, etc. The layman turned toward the physician and said: "Doctor, you are very much like an engineer, who is destined to remedy alterations of a wonderfully complicated machine, without knowing anything of its structure." It strikes me that the manufacturer has found the truth. In fact, a physician, who is not well posted in anatomy, both macroscopical and microscopical, is on the same level with an Indian medicine-man, who dabbles all the time in therapeutics, and when asked why he gives a certain herb in one disease and a certain mineral in another, refers to his experience only, without the least scientific foundation.

I am far from blaming any physician, who, perhaps ten or even five years ago, has studied microscopy, and left it dis-

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gusted or in despair. The standard doctrine of "cells" and the "cellular pathology," was unsatisfactory indeed. No thinker could ever have been content with the principles of the cell-doctrine, and everyone is aware of the little advantage medicine has gained from the cellular pathology. Beyond the proof of the presence of "cells," microscopy did not advance, and the examiners have been satisfied, if they could see "cells," the greatly varying shape and size and appearance of which they had to admit, without knowing any of the causes of the variations.

To-day the cell-doctrine is surpassed by new discoveries. Instead of looking at the shape of the "cell," we have learned to study the minute structure of its mass, the so-called protoplasm, of which we know that it represents a constituent part of the organism. Many of the morbid relations of the protoplasm have been revealed, and made use of for practical purposes. We climb upward upon the shoulders of the ingenious founder of the cellular pathology, R. Virchow; and that the new doctrine, for which has been proposed the term "*Bioplasson-Doctrine*," has really arrived at a certain point of perfection, I presently intend to demonstrate.

Let us first take into consideration the fluid, with the examination of which the physician is mainly interested: the urine. In my conviction, it is in vain to study the sediments of urine, without a thorough knowledge of the minute anatomy of the kidneys, and in vain will anyone endeavor to understand the kidneys without a good knowledge of their constituent tissues: connective tissue, blood-vessels, nerves, epithelia. The knowledge of the structure of the kidney involves the knowledge of the whole histology. For the present I will confine myself to the consideration of two formations in the sediments of urine only, viz.: the tube-casts and the pus-corpuscles.

We know that the renal artery, after repeated ramifications on the boundary between the cortical and the pyramidal substances, sends branches upward into the former at pretty regular intervals, from which arise the arterial roots of the tufts, the afferent vessels. The tuft itself is formed by capillary loops, which empty their blood close to the entrance of the afferent vessel into an artery again, the efferent vessel; this lastly branches into the capillaries of the cortical, and partly also of the pyramidal substance. The tuft, after C. Ludwig, has to be considered as a greatly widened river-bed of the afferent artery, at the same time split into numerous narrow capillaries, which being doubled over, unite in the efferent artery. The capillaries of the tuft contain arterial blood; they produce, what has been termed by old anatomists, "an arterial wonder-net." The tuft is surrounded by a connective tissue capsule, and into the cavity of this capsule is poured the first formed, almost completely watery urine. Through the researches of Bowman of London, we know that the capsule opposite to the point of insertion of the afferent and efferent vessels is perforated by, and continuous with the convoluted tubule of the first order. These tubules occupy only the lower portion of the cortical substance. The convoluted tubules pass into the narrow or loop-tubules (Henle), which, after having reached a certain depth in the pyramidal substance, turn back into the cortical substance, and become widened again, so as to form the convoluted tubules of the second order, on the outermost part of the cortical substance. These convoluted tubules empty into straight tubules, which, by repeated union of analogous tubules, become larger and fewer, lastly terminating on the points of the pyramids.

We know that the three varieties of uriniferous tubules, viz., the convoluted, the narrow and the straight, are lined by three varieties of epithelia: the convoluted tubules by

cuboidal, the narrow tubules by flat, and the straight tubules by columnar epithelia. All formations of the kidney are surrounded with and accompanied by a delicate connective tissue, bearing a large number of bloodvessels. The capillary bloodvessels, especially those forming elongated loops in the pyramidal substance, lie together with bunches of the narrow tubules. With this elementary knowledge, we are ready to understand some of the morbid processes in the tissues of the kidney.

Since Richard Bright in 1827 drew attention to kidney diseases, so often fatal, the term "Bright's disease" has been widely used by pathologists and physicians for the designation of different morbid processes, of which we understand to-day that they are partly primary, partly secondary, and mainly inflammatory in nature. Indeed, the term "Bright's disease" includes so many processes, that it has to be considered as an unscientific one, worthy of being completely forgotten. Virchow first analyzed the inflammation of the kidneys in a satisfactory manner, though his views on the seat and termination of the inflammation,—either in the interstitial connective tissue, or in the epithelium—are not tenable. The inflammation may start in any of the constituent tissues of the kidney, the epithelial lining as well as the interstitial connective tissue will participate in the morbid process under all circumstances. It is only the degree of the inflammation, and the product of the process, which bring about different results.

Dr. Alfred Meyer has carefully examined with the microscope, the different forms of nephritis in my laboratory; the results of his researches are published in the Transactions of the Imperial Academy of Sciences of Vienna, 1878. He found that it would be better to return to the old-fashioned denominations, viz., catarrhal, croupous, and suppurative nephritis, the difference being thoroughly established both

by the exudation and the material changes in the tissues of the kidney. In catarrhal nephritis, besides serous exudation, first swelling of the epithelia, later desquamation, and lastly destruction of the epithelia takes place. These latter, after having been reduced into indifferent or medullary elements, together with others arisen from the connective tissue lead to a considerable increase of the interstitial connective tissue, to shrinkage of the kidney, with the termination into cirrhosis, the small, granular kidney.

In catarrhal nephritis, the urine will exhibit besides a varying amount of dissolved albumen, even this sometimes is missing, only desquamated epithelia of the kidney more or less changed, but no tube-casts. The highest degrees of shrinkage of the kidneys may be induced, without any other sign under the microscope, during the life of the patient.

In croupous nephritis the most characteristic features are the tube-casts, first seen and explained as croupous exudation by Henle in 1841. The interstitial connective tissue is considerably infiltrated with medullary or inflammatory elements; the small arteries, especially the capillaries within the tufts are dilated and transformed into masses fully analogous to those of the tube-casts; at least the walls of the vessels are saturated with a substance identical with that in the tubules themselves. The formation of tube-casts has been explained in three different ways: by mere croupous or fibrinous exudation, by transformation of the epithelia, and by secretion from the epithelia.

The micro-chemical researches of Rovida have revealed that the casts cannot be considered as simple fibrine or albumen or colloid, but giving the reaction of proteinates, must be looked upon as a somewhat modified albuminous substance. Doubtless this substance is an exudation from the bloodvessels, and in so far the expression, "croupous nephritis" is justified. The epithelia themselves as a rule

are present around the cast, though very irregular, mangled and flattened, and in the substance of the cast we often meet with traces of swollen and altered epithelia. Inasmuch as every fluid, being once in the lumen of the bloodvessel, and afterward in the lumen of the tubule, necessarily must have passed through the epithelia, the secretion-theory is not tenable; but the question arises: are the epithelia only partly or completely transformed into the mass of the cast? In the former instance the epithelia around the cast must be considered as remnants of the original ones; in the latter instance as altogether newly formed. Which of these views is the correct one, we as yet have to decide.

Croupous nephritis under all circumstances is a severe disease. There are but two conditions known, in which complete recovery takes place, viz., in children after scarlet fever or diphtheria, owing to the great recuperative power of the juvenile age, and in women during pregnancy and after delivery, owing probably to the fact that only the right kidney is attacked by the disease, through pressure of the pregnant womb upon the right ureter, while the left kidney is little changed, and is fit for performing the duties of both. In persons who have recovered from croupous nephritis, even many years afterwards, when they die of some other disease, the traces of nephritis are visible on the surface of the kidney in the shape of irregular cicatricial retractions. Within these the tubules are missing or present as irregular clusters of epithelia, the so-called atrophy. In the great majority of the cases of croupous nephritis the prognosis is unfavorable, and if one attack is not sufficient to induce fatal termination, nay partial recovery is possible, sooner or later the fatal end will ensue through uræmia.

The most characteristic sign of croupous nephritis is the presence of tube-casts in the urine, and in my experience the casts are always indicative of the disease, the more so, the

larger the accompanying amount of the albumen. Reliable observers have seen casts without any albumen in the urine, and it has been asserted that mere hyperæmia of the kidneys may suffice to throw casts into the urine, without any evil consequences, for instance, in treatment with large doses of iodide of potash. The former assertion I can corroborate; the latter is not in concurrence with what I have seen; the casts surely indicate nephritis, and the larger their number, the more serious is the disease.

We distinguish six varieties of tube-casts, viz., hyaline, epithelial, blood, granular, fatty and waxy casts. Their diagnostic value is as follows: The hyaline and epithelial casts,—I do not mean the desquamated epithelial tubes, but hyaline casts, studded with epithelia,—indicate acute croupous nephritis. The blood-casts show hemorrhage within the kidney; a larger number of such casts almost always foretells fatal termination in a short period of time. If blood-casts have been retained in the tubules for some time, the blood-corpuscles lose their shape, and the cast looks like a dark red-brown, granular cluster. Granular, fatty, and waxy casts appear in the protracted, chronic forms of croupous nephritis; the granular especially are due to the disintegration of the lining epithelia; the fatty indicate fatty degeneration of the kidneys, secondary to croupous nephritis. In all these instances the substance of the cast is the same, and only the outer adhering formations give the difference in the appearance. Waxy casts are different in their chemical nature from hyaline casts, being characterized by a great refracting power, wavy, curved outlines, and a high degree of brittleness. Such casts will not be seen,—against the views of recent writers,—unless waxy degeneration has been established in the kidneys.

Besides a great prognostic value attaches to the size of the casts. As a matter of course, casts formed in the con-

volute tubules of the first order, never will appear in the urine, as they cannot pass the narrow tubules. The mildest degrees of the disease are indicated by casts from the narrow tubules, the narrowest casts, and a small number of casts from the convoluted tubules. Not infrequently we meet with pedunculated casts, viz., formations from the place of transition of the narrow tubules into convoluted tubules of the second order. Casts from the convoluted tubules justify the diagnosis of croupous nephritis in the cortical substance; casts of all the three sizes, the largest arising from the straight tubules, permit of a conclusion of croupous nephritis in the whole organ, and upon this occurrence a very unfavorable prognosis can be established.

Based on these simple facts I was enabled to give a prognosis, even where no danger was suspected by the attending physician. Dr. X., a prominent practitioner of this city, two years ago brought me some fresh urine passed by his son, six years old, who had just recovered from a slight diphtheritic attack of the throat. The question was, whether in the fresh urine there could be seen moving micrococci and bacteria. I really found these low organisms, but besides also numerous tube-casts of all the three sizes. I told the father that his son was in danger, and should be kept in an even temperature and on a low diet. He laughed at me and asserted that there was nothing from the clinical standpoint to justify such an alarming diagnosis. This happened on a Sunday, and I did not hear of the child until next Wednesday, when I was informed, that the boy had died in a uræmic fit. The physician now began to believe in microscopy,—since he even purchased a microscope, and last year in January he brought me some urine of his wife, containing a moderate quantity of albumen. In this urine I found fatty casts from the convoluted tubules, and as the gentleman wanted to have a prognosis, I told him that his wife had to

live for only one or two years longer. In this case I was mistaken, as the lady three months afterwards was carried away by uræmia.

As to the pus-corpuscles, which appear very often in the sediment of urine, I would remark that in general, their source cannot be told, unless they be accompanied by desquamated epithelia. The largest of these come from the urethra and the vagina; the smallest from the kidneys, and they generally decrease in size, the higher up they cover the urinary tract, those from the pelvis being often caudate, viz., provided with elongations of different shapes. In chronic catarrhal cystitis the flat epithelia, with which we invariably meet in acute inflammation, are as a rule missing, but the pus-corpuscles are provided with dark-brown pigment-granules, so as to allow of a correct diagnosis of chronic cystitis. When the pus-corpuscles are mixed with epithelia of the kidney, both being present in a large number, the diagnosis of a suppurative process in the kidney is to be made, the surer, if shreds of fibrous connective tissue be admixed to the pus. When, besides the mentioned occurrences also crystals of hæmatoidin, small red-brown prisms and needles are present, remnants of a former hemorrhage, the diagnosis will be: chronic abscess of the kidney. Such a diagnosis proved to be correct in a case of Dr. Stephen Smith. A suppurative process in the kidney is always accompanied by croupous nephritis, hence the characteristic features of both, viz., pus-corpuscle; and tube-casts may be found in the sediment of the urine.

The examination of the sputa also can throw light upon a number of morbid processes in the respiratory tract. The most common question of physicians is: what is the difference between mucus and pus-corpuscles? The mucus, as well as the salivary corpuscles are protoplasmic bodies, formerly inclosed in a shell of cement-substance, and thus forming

what we call epithelia. The transformation of protoplasm into saliva, mucus, and pepsin, has been carefully studied by R. Heidenhain, of Breslau. The transformation into mucus can directly be demonstrated on the epithelia of mucous glands of the frog's skin, and on the columnar epithelia of the small intestine of any freshly killed animal, from which we remove parts of the mucous lining with curved scissors. On the epithelia of such slices we succeed in watching the process of the formation of mucus-globules from the protoplasm of the epithelia, after we added a drop of a very dilute solution of chromic acid or bichromate of potash; pure water being too impetuous in its action. We see the protoplasm swell and transformed into a pale homogeneous mass, nearest to the top of the epithelia. Here the shell of the cement-substance bulges out, and is thinned, until it becomes broken on the point of the greatest convexity and allows the escape of the mucus-globule. Not infrequently the whole mass of protoplasm is evacuated from the interior of the distended shell of cement-substance, which being partially or totally emptied, gives the aspect of what has been termed a "cup- or goblet-cell." This lump of protoplasm is now a mucus-corpuscle, and still endowed with properties of life. Where an inflammatory process is established, the living matter of the protoplasm of the epithelia is soon increased; in other words, the protoplasm becomes coarsely granular, and if freed in this condition, forms what we call a pus-corpuscle. The main difference between a mucus- and a pus-corpuscle, therefore, is that the former looks finely, the latter coarsely granular, though both are essentially the same thing. Pus-corpuscles on the average are also more coarsely granular than colorless blood-corpuscles, with exceptions which I propose to explain later on. The identity of these bodies cannot be maintained, and the assertion of J. Cohnheim, that all pus-corpuscles, nay all inflammatory elements

are merely emigrated colorless blood-corpuscles, is a great mistake. The formation of pus-corpuscles from epithelia and connective tissue directly can be observed, and no one has the right to call pus-corpuscles altogether emigrated colorless blood-corpuscles, though all of us agree that these share in the formation of pus.

We cannot tell by watching pus-corpuscles in the sputa, what their source is; perhaps black pigment-granules in the pus-corpuscles indicate that they have arisen from a pigmented lung. Only the presence of elastic fibres in the sputa is a sure sign of destruction of the lung, inasmuch as such fibres are present in a varying amount in the walls of the alveoli. Of what nature the destruction is, can be ascertained only, if the elastic fibres be accompanied besides pus-corpuscles, also by shrivelled up and broken protoplasmic lumps, which indicate cheesy transformation of the inflammatory product, so common in tuberculosis. These occurrences in the sputa of a gentleman, shortly after his return from Florida, where he had spent several years in a good condition, led me to the diagnosis, that the tuberculous ulceration was rapidly advancing in his lungs, and would be followed soon by death, which proved to be correct.

Exceptionally also the new formation of sarcoma in the lungs can be diagnosed by the examination of the sputa alone, as illustrated by the following case which occurred three years ago. A justice of this city, about sixty years of age, had a tumor in his right groin, which after repeated extirpations always recurred and recently began to grow rapidly. The consulting surgeons made the diagnosis "cancer," and foretold an approaching ulceration, for which the relatives had to be prepared. The attending physician, Dr. Schöney, soon afterward brought some sputa of the patient into my laboratory, being struck by their large quantity. On microscopic examination besides pus-corpuscles, also numer-

ous globular elements were seen, characteristic of the so-called round-cell-sarcoma. The diagnosis was: secondary formation of the sarcoma in the lungs, due to a primary sarcoma in the groin, which latter would not ulcerate. The post-mortem examination a few weeks afterward fully corroborated my diagnosis, though I never had seen the patient. The lungs were crowded with white nodules of sarcoma, and the tumor in the groin proved to be an alveolar sarcoma, which had never come to ulceration.

The examination of rectal discharges may give valuable information as to the nature of the disease. We can tell catarrhal proctitis from the presence of cylindrical epithelia, broken down, and coarsely granular or almost homogeneous, before their transformation into pus. In dysentery the pus and blood-corpuscles are prevalent; in blennorrhœa, pus-corpuscles are present only. Ulcerative destruction is indicated, if, besides the named formations, also shreds of fibrous connective tissue be present; while single or grouped smooth muscle-fibres lead to the diagnosis of a deep ulceration. Recently this diagnosis was made in my laboratory, in a case in which no clinical diagnosis was possible, on account of the seat of the disease in the upper portion of the rectum.

Many different things, passed through the rectum, come to a microscopic examination. Dr. Stephen Smith brought me a large brown sheet, passed by a lady, which proved to be a part of the leaf of a tree. A druggist sent a number of pale yellow villous clots, which had been passed by a girl after a dose of cathartic, having apparently caused severe abdominal pains. The clots proved to be cores of oranges. The most interesting case in this series is the following: Dr. V. Marvlag, of Elizabeth, N. J., two years ago sent me a large quantity of a villous mass, the like of which had been passed by a woman for several years. Different physi-

cians had suspected an abdominal pregnancy, with subsequent perforation into the rectum, which diagnosis was apparently sustained by a scar on the posterior wall of the vagina. I found under the microscope nothing but remnants of plants, thorns, spiral air-vessels, and little changed vegetable protoplasm, enclosed in a frame of cellulose. I wrote to the doctor that the patient was hysteric, and intended to deceive the physicians by swallowing raw vegetables, of what nature I could not tell. The doctor showed my letter to the woman, who began to cry, and asserted that she never had done such a thing. The queerest part, however, is that since she knows that we know what the matter is, she is cured, and never since has passed any of the former masses.

The microscopic examination of tapped fluids may, under certain circumstances, give important hints as to the nature of the disease. My experience in this department being not very large, I will confine myself to the consideration of fluids from the abdominal cavity only. We know that in the fluid of ascites there exists a varying amount of dissolved albumen and fibrin, sometimes also of mucin. The morphological elements are swelled endothelia of the peritoneum, often together with a few pus-corpuscles. The cysts about the uterus and in the broad ligament contain only dissolved albumen, but scarcely any protoplasmic bodies. The cysts of the ovary are characterized, after the discovery of Drysdale, by the presence of large round bodies, coarsely granular, not yielding to acetic acid. These bodies are flat epithelia in fatty degeneration, and were thought to be characteristic of ovarian cyst. In several cases I made the diagnosis of such a cyst, which proved to be correct. In one case the clinical diagnosis was retro-uterine abscess, while I asserted, upon finding Drysdale's corpuscles in the tapped fluid, that the disease must be an ovarian cyst in

suppuration. On the post mortem examination my diagnosis was found to be right. Recently, however, we have learned from our excellent gynæcologist, T. Gaillard Thomas, that these corpuscles are present also in extra-uterine pregnancy, which diagnosis he maintained, although a microscopist found Drysdale's corpuscles in the tapped fluid. Had I examined the fluids, in all probability I had made the same mistake; but has anyone the right to blame microscopy for such mistakes? I think not. The science of microscopy is as yet in the cradle, and it is only by faithful co-operation of the clinician with the microscopist, that we shall succeed in raising its level to the highest possible standard. The standpoint of some microscopists, who look with contempt at the work of the practitioner, and that of some clinicians, who laugh to scorn the sterile efforts of theoretical microscopists, are equally wrong. Success is warranted only by the united efforts of practice and theory, and the result of such combined work will be a real gain to science.

The microscope plays an important part in the examination of morbid new-growths, and I fully concur with Prof. Lücke of Strassburg, in the desire that every practitioner should be acquainted with the minute structure of tumors, which would enable him to give a more correct diagnosis and prognosis than is the case at present. Very often we decide about the future of the patient through microscopical examination of tumors, either after extirpation or before it, when small parts of the tumor are cut out for diagnostic purposes.

We know that there exists a series of tumors, the so-called benign ones, which do not materially interfere with the health of the patient. Such tumors are either formations of connective tissue, with fully developed basis-substance in its four main varieties, viz.: myxomatous, fibrous,

cartilaginous, or osseous, such as myxoma, fibroma, chondroma, and osteoma. Or the tumors represent imitations of fully developed tissues, arisen from the middle layer of the embryo, such as angioma, lipoma, neuroma, myoma; or, lastly, they are combinations of epithelial and connective tissue, such as papilloma and adenoma.

Another series of tumors, on the contrary, being called malignant, have a deleterious influence upon the constitution of the patient. They grow rapidly, are painful, liable to ulceration, recur very often after extirpation, and produce secondary tumors in internal organs. For the differentiation of these growths we are greatly indebted to R. Virchow. He has first cleared up the fact that some of these tumors are formations of connective tissue in its undeveloped, or embryonal, or medullary condition, for which he proposed the rather poor denomination "sarcoma;" while others are combinations of epithelium and connective tissue, the so-called cancer forms. A third variety of tumors exhibits intermediate stages between the two kinds, and they represent what is termed, a popular expression, suspicious tumors, such as myxo-, fibro-, chondro-, osteo-sarcoma, etc. These tumors, upon their first appearance, do not impair the constitution of the patient; but in turn, or after repeated extirpations, or rather trials of extirpation, become decidedly malignant.

The study of the minute anatomy of tumors, in its present condition is as yet far from being satisfactory. Still, if the question should be raised, whether microscopy has advanced so far as to give a thorough decision of the benign, suspicious, or malignant nature of a tumor, the answer doubtless will be a hearty: Yes, it has.

There are but very few points worthy of consideration as to the nature of a tumor. The more of a basis-substance of the above description is present, the smaller, therefore,

the amount of free protoplasmic bodies, the surer it is that the new growth is of a benign nature. On the contrary, the smaller the amount of basis-substance, the larger the relative number of protoplasmic bodies, the more certainly does the tumor belong to a malignant type. The very worst tumors, glioma, round-cell-sarcoma, and medullary cancer, exhibit a rather trifling share of fibrous connective tissue. The difference mentioned, namely, is true not only for sarcoma, but also for cancer. The more the connective tissue prevails in comparison with the epithelial formations, the less malignant in its course, the more we are entitled to term it a "Scirrhus;" while in the fast-growing and rapidly killing medullary cancers, the frame of connective tissue, bearing the bloodvessels is very small, and the epithelia are ill-developed, viz., remained in their medullary or embryonal condition.

Combinations of fully developed basis-substance, with partial retention of the embryonal character, are by no means rare; they involve what is termed the suspicious nature of the tumor. These tumors allow of a prognosis of recurrence after extirpation, or of a gradual change for the worse, when the surgeon, judging from the appearances to the naked eye, has not the slightest idea of the threatening danger. The inflammatory process in even benign tumors may mislead the microscopist in rather exceptional instances, and it is only by a thorough examination of different parts of a tumor that a correct decision as to its nature is justified. The presence of inflammatory elements within the connective tissue frame of cancer is well known to be decisive of its malignant nature, and the circumstance that such elements not rarely can be found on the surface of an extirpated cancer-tumor, indicates on the one hand that recurrence will rapidly ensue, on the other hand that such elements play an important part in the new growth of epithelia, characteristic of cancer.

I have examined numerous tumors, both in small excised pieces for test, and after extirpation, and often had to contradict the views of the attending surgeon. I cannot tell, of course, how far my diagnoses were correct in all instances; but so far as prognosis is concerned, I very rarely was mistaken. I would illustrate my assertion with only one case, this being the most recent one. Dr. Louis A. Duhring of Philadelphia, exhibited at the meeting of the Amer. Dermatol. Association in Saratoga last August, a remarkable case of tumors of the skin on a lady. This lady had evidently a healthy constitution, and the tumors bore all clinical features of benign—nay, only inflammatory formations. A few weeks since the doctor sent me a number of sections from one of the tumors for microscopic examination. I found the characteristics of a fibro-sarcoma, formerly called recurrent fibroma, and though I had not seen the patient since August, and not heard of her, I wrote to the doctor that the tumors, sooner or later, will interfere with the health of the lady, and, turning to the worse, exert their deleterious influence upon her constitution. The doctor several days ago wrote me a letter, stating that the health of the patient is failing more and more since she left Saratoga.

I now come to the last of my propositions, which is based entirely on my own discoveries, viz., the relation of single protoplasmic bodies to the constitution of the individual.

In 1873 I published the results of my researches on protoplasm in the Transactions of the Imp. Acad. of Sciences of Vienna, announcing that the protoplasm has a reticular structure. Each protoplasmic lump, in a certain stage of development, exhibits numerous conical threads, emanating from the nucleus, and inosculating with the neighboring granules of the protoplasm. All granules are connected with each other by extremely delicate threads, so much so

that the granules must be considered as the thickened points of intersection of a network which traverses the mass of the protoplasm, and is in connection with a thin uniform layer, bounding the whole lump. I declared that the nucleus, the granules, the uniting threads, and the inclosing shell, are formations of the living matter, while the substance filling the meshes and the vacuoles is a fluid, and as such devoid of life.

At that time I was quite alone in my assertions. Shortly afterwards J. J. Woodward, of Washington, published micro-photographic plates of cancer specimens, on which, wherever the protoplasm was in a right focus—unfortunately this is but exceptionally the case in micro-photographs,—the network in its interior was plainly visible. The first good investigator, who corroborated my discoveries in every respect, and announced this publicly, was Dr. Louis Elsberg, of New York. To-day over a dozen of the best microscopists abroad, agree with me in the view of the reticular structure of the protoplasm, though a number of them have studied this in nuclei only. But a few have accepted the doctrine that the network itself is a formation of the living matter.

Living matter has two characteristic properties, viz., motion (change of shape, amœboid motion, and change of place, locomotion), and the capacity of producing its own kind (nutrition, growth and generation). These properties are due to the network in the protoplasm also. We see the network changing its shape and place during the amœboid motions and the locomotions of the protoplasmic lump in an amœba, a colorless blood corpuscle or an isolated or connected protoplasmic body of any description. Recently L. Elsberg has discovered in my laboratory that also the colored blood-corpuscles exhibit the reticular structure of protoplasm after the colored substance, held in the meshes,

is extracted by a dilute solution of bichromate of potash. The colored blood-corpuscles under these circumstances demonstrate slow, but distinct amœboid motion. The growth and new formation is observable on the granules of the living matter within the protoplasm during the growth of the whole body and in the inflammatory process, where the endogenous and exogenous new formation is based altogether upon the increase of the living matter.

The amount of living matter within a limited bulk of protoplasm varies greatly in different individuals. It is obvious that what is called a healthy or vigorous constitution, is based upon a large amount of living matter in the body, the new growth of which in morbid processes is very lively; while a strumous or scrofulous or phthisical constitution must be caused by a relatively small amount of living matter, the new growth of which is scanty in morbid processes. In other words, a lump of protoplasm will exhibit coarse granulations, or it will be almost homogeneous looking under the microscope, owing to the large amount of living matter in strong individuals of good constitution, while the protoplasm taken from a person with weak or strumous constitution will be finely granular, as but little living matter is present in it.

Two years ago I had the pleasure of announcing first before this Society that pus-corpuscles show remarkable differences in their minute structure in different individuals. Those from otherwise healthy and strong persons are yellow, almost homogeneous or coarsely granular, I said, while those arisen from broken-down, weakened or strumous persons are pale, gray and finely granular. This fact has been made use of in hundreds of cases, when pus-corpuscles, mainly in urine, were brought by different physicians in my laboratory for examination, for telling whether the pus belongs to a good or a bad constitution, of course with-

out any knowledge of the patients themselves. I was right in every instance ; not one mistake has occurred.

About one year ago I announced before this Society that also the colorless blood-corpuscles demonstrate striking differences as to their minute structure, according to the general constitution. I said that the colorless blood-corpuscles are coarsely granular and slow in their amœboid motions under the microscope, if taken from healthy, vigorous, strong persons ; on the contrary, they are pale gray, finely granular, viz., poorly provided with living matter, in broken down or phthysical individuals. I expressed my hopes that at some future time practical use might be made of these differences. To-day my hopes have turned, after three years' earnest study, into accomplished facts.

The method of examination of the blood for our purpose is extremely simple. We oil the edges of a thin covering glass on one side with a curled piece of paper, serving as a brush. Prick with a pointed pin the palmar surface of the thumb, near the wrist joint, this giving a good convex surface, and being least incommoded by the injury. Squeeze out a small drop of blood, the size of which has to be learned by some practice. Put the glass slide on the drop for transportation, and immediately cover up the specimen with the covering glass, the oiled edges looking toward the slide. Such a specimen holds the blood in a living condition at least one hour. It is not necessary to use the heated stage, because the colorless blood-corpuscles exhibit their structure in an ordinary, comfortable temperature of the room, nay sometimes show slight amœboid motions. The magnifying power should be at least 800 diameters, the lens to be used being best a one-tenth of an inch immersion. As a matter of course, it ought to be a first-class lens, such as manufactured by Hartnack and by Vêrick in Paris, by Tolles in Boston, by Grunow in New York, and by a few

other opticians, whose lenses I have not as yet sufficiently tested for direct recommendation. Considerable skill is required for such studies, which embrace first the knowledge of the structure of the protoplasm in general. A few months, nay, a few weeks' thorough study under the direction of a reliable teacher will suffice to enable everyone to see what really can be seen in the protoplasm, and to entitle him to judge also of the differences. I never had difficulties in demonstrating the network of protoplasm to anyone who was in earnest with his microscopical studies, and took them for more than play. After having obtained a certain practice, one is enabled to tell differences in the anatomy of the colorless blood-corpuscles with a power of 500 diameters only.

Several years ago I was first struck by the fact that the elements establishing the condition of catarrhal pneumonia and of tuberculosis, both acute and chronic, are decidedly pale and finely granular. Next I learned that pus- and colorless blood-corpuscles of strong men are partly homogeneous, or at least coarsely granular. Then I followed these studies by examining the blood of different physicians who came to work in my laboratory (their number, since I established the laboratory four years ago, exceeds three hundred), and who could give reliable histories of both their families and their own bodies. Thus I have arrived at a point of perfection, which allows me to tell the constitution of a person without knowing anything of his former life.

Besides the differences in the structure of the colorless blood-corpuscles, as described above, valuable hints may be obtained from other circumstances. The number of colorless blood-corpuscles in a given drop of blood is surprisingly different in different persons; the better the constitution, the fewer are these bodies. A sleepless night, however, is sufficient to increase their number, which fact often enabled

me to tell physicians by examination of their blood, whether business is going slowly or lively, the latter inducing sleepless nights, or repeated awakening by patients, or so-called nervousness.

Catarrhal processes, so-called colds, of any of the mucous membranes, lead to increase of the number of the colorless blood-corpuscles; a chronic condition of these processes is indicative of a poor constitution *per se*. The colored blood-corpuscles greatly vary in their yellow tinge in different persons; the paler this tinge is, the more readily we can tell pale looks of the face or chlorosis. The colored blood-corpuscles stick together in coin-like rows only when the plasma holds a larger amount of fibrin; in the blood of persons with a poor constitution, such rows do not occur; in individuals of moderate vigor, the rows temporarily may be missing, at other times present. In the blood of persons of good constitution, who had passed through severe ailments; I several times found both coarsely and finely granular colorless blood-corpuscles, just as in originally healthy persons, who, by chronic diseases, become broken down.

In fact, the microscope reveals so much of the general health of a person, that more can be told by it in many instances than by the naked eye, or by physical examination. Life insurance should be based upon microscopical examination, as well as on percussion and auscultation. Marriages should be allowed in doubtful cases, only upon the permit of a reliable microscopist. Last season a young physician asked me whether I believed in the marriage among kindred? He fell in love with his cousin, and so did the cousin with him. I examined his blood, and told him that he is a "nervous" man, passes sleepless nights, and has a moderately good constitution. The condition being suspected in the kindred lady, marriage was not advisable for fear that the offspring might degenerate. So great was his faith in my

assertions, that he gave up the idea of marrying his cousin, offering her the last chance, viz., the examination of her blood. This beautiful girl came to my laboratory, and, very much to my surprise, I found upon examination of her blood a first-class constitution. The next day I told the gentleman, "You had better marry her."

As a matter of course, every particle of the organism, either in a normal or in a morbid condition, will exhibit characteristics as attributed to the colorless blood-corpuscles. The protoplasm is one uninterrupted mass throughout the body, and the living matter is connected from the top of the head to the heels, in what we call tissues. Several months ago, Dr. Paul F. Mundé brought me a specimen of the size of a pea, which, he said, he found in a large amount of fluid blood vomited out half an hour before by a patient. After immediate examination of a section from the specimen, I told the doctor that his patient was a pale, emaciated, narrow-chested person, who had catarrhal pneumonia, which led by localized gangrene to sloughing of the piece of the lung, on which a broken bloodvessel was visible. I foretold, besides, that the patient will die within one year. I explained to the doctor and to Dr. L. Elsberg, who also was present in the laboratory, what led me to such a diagnosis and prognosis. There were visible alveoli of the lung, and both the walls of the alveoli and their calibers were crowded with inflammatory elements, coagulated fibrin being absent. These are symptoms of catarrhal pneumonia. On some parts clusters of micrococci could be seen,—characteristic of putrefaction, therefore gangrene of the tissue. The inflammatory elements looked very pale and finely granular, the evidence of a bad, phthisical constitution, and all these signs together allowed the diagnosis of a limited viability, hence the disastrous prognosis. The doctor told us that no physical symptoms could be found in the lungs,

justifying my diagnosis. Still he admitted right away that the patient was a pale-looking, thin, and narrow-chested young man, whose brother had been sent to Florida some time ago for chronic tuberculosis of the lungs. One week afterward the doctor came to tell me that the physical symptoms at present were so marked on the lungs, that the diagnosis of catarrhal pneumonia was evident. Seven weeks afterward the patient was dead.

The facts here laid before the medical profession, may convince even the most sceptical physician that microscopy is destined to play an important part in the science of medicine. Let us proceed in skillful honest work, and we shall succeed in raising the standard of microscopy still higher, and make it not only a valuable, but rather an indispensable assistance to clinical work. Much more could and should be done in this country by the profession at large, than is done at present, for the perfection of that most interesting and useful science, the science of ourselves,—
Biology

ELEMENTARY LESSONS IN ELECTRICITY.

By A. FLOYD DELAFIELD, A. B.

IT is my intention in these papers to draw up an outline of the principles of electricity, as concise as clearness permits, which shall afford to those using electrical apparatus sufficient information to enable them to select such apparatus with judgment, and apply it to best advantage. In this number I shall explain some of the terms employed in the science, and describe a few experiments which illustrate the meaning and use of the terms. In subsequent numbers I shall describe the different forms of apparatus used for the production of electricity, and explain what results may be expected from each, giving particular attention to the selection and arrangement of batteries, and the different effects produced by differences in the number and size of their elements.

It is hoped that this series of articles will meet the wants of those who, while desiring exact and accurate information about electricity, cannot spare the time to study elaborate treatises.

I. 1. Electricity is a form of energy. It cannot be defined, but is described by enumerating the phenomena it produces, such as attractions and repulsions, magnetic, chemical, physiological and other phenomena.

There are several ways of developing electricity.

a. By rubbing dissimilar substances together.

b. By placing dissimilar substances in contact or in a liquid.

c. By warming or cooling the junction of two dissimilar substances.

d. By changes in a system of magnets and wires, either in the strength of the magnets, or in the relative position of the parts of the system.

Besides these methods there are others not practically used.

The terms frictional electricity, galvanic electricity, magneto-electricity, etc., often employed, refer to electricity produced in different ways, and not to different kinds of electricity. We know of but one kind of electricity, whatever means may be employed to produce it.

2. A body having more or less electricity than the earth near it, is said to be electrified. If it has more than the earth, we say it is positively electrified, if less, negatively.

The degree of electrification of a body above or below the earth near it, irrespective of the size or nature of the body, is called its potential. It is analogous to temperature, which is also an idea independent of mass.

The course of differences of potential is called electromotive force. The unit or standard of electromotive force is called a volt, and is about equal to the electromotive force produced by any form of sulphate of copper battery. We say, for instance, the electromotive force of a certain battery is two volts, just as we should say the weight of an apple is six ounces, or the capacity of a tumbler is half a pint.

In any electrified body there is a certain quantity of electricity which can be measured.

The quantity of electricity which can by any means be

gotten into a body is limited by its capacity, which depends on its surface—a hollow ball having the same capacity as a solid one.

The capacity of a body is affected by neighboring bodies.

3. If two bodies of different potentials be connected by a wire, the excess of electricity above the mean of the two passes from the body of higher to that of lower potential, and we say, a current of electricity passes from the first to the second.

When we speak of the strength of a current, we mean the quantity of electricity that passes per second.

It is found that the nature and size of the wire joining the two bodies of different potential, affect the strength of the current.

The degree to which the wire opposes the passage of the current is called its resistance, and is independent of the strength of the current.

Bodies of small resistance are called conductors. Those of very great resistance are called insulators.

The unit or standard of resistance is called an ohm, and is practically a certain piece of wire kept at Kew in London, exact copies of which have been sent all over the world, and are used for measuring the resistance of coils of wire, and for other purposes.

In measuring resistances we use a set of wires of one, two, etc., ohms resistance, just as in weighing we use a set of weights of one, two, etc., pounds or ounces.

4. If two bodies at different potentials be connected by a substance having a very high resistance, such as air, glass or india rubber, the potentials of the two bodies do not become equal; a certain quantity of electricity passes into the air or glass, or other insulator, and then the whole system attains a condition of equilibrium.

5. Electricity in equilibrium is statical electricity.

Electricity in motion is dynamical electricity.

A mass fixed at any height above the surface of the earth, possesses energy similar to statical electricity.

A mass falling from such a height possesses energy similar to dynamical electricity.

II. Methods of producing electricity.

In treating of the methods of producing electricity, it is convenient to speak first of friction, although for the production of electricity for practical purposes, this method is never or at least, seldom used. There are certain very important experiments however, which are most conveniently made with frictional apparatus. In making these dry weather must be chosen, as a damp atmosphere is a conductor of electricity, and in such an atmosphere no great difference of potentials can be maintained.

The simplest form of frictional machine consist of a piece of glass, hard rubber, or sealing wax, and a piece of silk, or a catskin. On rubbing one of the first mentioned bodies with one of the second, electricity is developed in both of them. The potential of one is raised, and that of the other lowered.

If the electrified glass or other substance be held near some light body, this will be attracted to it, but as soon as it has touched the glass or other electrified body, it will be repelled.

This simple experiment is the basis of the whole science of electricity. It is most convenient to make it in the following way :

Provide three glass standards a few inches high, bent in the shape of a small Roman f, and fixed in wooden or metal bases. Let us call them numbers 1, 2 and 3.

Now from 1 and 2 suspend single small balls of pith by fine silk threads, so that they hang free, and from 3 suspend in the same way two balls so that they touch each other.

Let us also have a rod or tube of glass a few inches long, a stick of ordinary sealing-wax, and a piece of silk, such as a handkerchief. We can now make the following experiments.

1. Rub the glass or sealing-wax briskly with the silk handkerchief, then hold it to ball No. 1. The ball is attracted, but as soon as it has touched the rod, it is repelled.

2. Rub the rod again, and hold it then to the pair of balls No. 3. They behave as did the single ball, but on allowing them to touch the rubbed rod and then removing this, they will come to rest, not touching each other however, but standing off from one another.

3. Bring 1 and 2 near each other. Touch No. 1 with the glass rod, after this has been rubbed, and touch No. 2 with the rubbed sealing-wax. The two balls will now attract one another, but if they be allowed to touch, they fall apart again and lose all sign of electrification.

From these experiments we see that :—

1. An electrified substance attracts a light non-electrified body.

2. An electrified substance repels a body that has touched it.

3. A body touched by rubbed glass or sealing-wax, repels one touched by the same substance, and attracts one touched by the other substance.

It is by carefully making such experiments as these, that the following laws have been demonstrated :—

1. On rubbing glass and silk together, the potential of the glass is raised, and that of the silk lowered.

2. On rubbing sealing-wax and silk together, the potential of the sealing-wax is lowered, and that of the silk raised.

We know of no reason for this, any more than why electricity should be produced at all in either case, we can only say, such are the facts.

3. On bringing an electrified body in contact with one of

a different potential, a portion of the electricity passes to the body of lower potential. It is for this reason that we can electrify the suspended balls by touching them with the rubbed rods of glass and sealing-wax. This also explains the fact that the two balls touched, one by glass of raised potential, and the other by sealing-wax of lowered potential, lose all sign of electrification on touching each other. The potential of one has been raised, for the glass touched it, electricity went into it—that of the other lowered, for electricity passed from it to the sealing-wax. Now on bringing the balls together, supposing them to be of one size, all the electricity passes from the ball of higher potential to that of lower potential, and they are thus brought to the potential of the earth, that is, they are both at the potential zero ;—are not electrified at all.

4. Two substances, the potential of both of which is higher or lower than that of the earth, repel each other—if the potential of one be higher, and that of the other lower than that of the earth, they attract each other.

EDITORIAL DEPARTMENT.

THE PRESENT ASPECT OF THE QUESTION OF TETANOID PARAPLEGIA.

SYNONYMS, *Spastische Spinalparalyse*, ERB ; *Tabes dorsal spasmodique*, CHARCOT.

By E. C. SEGUIN, M.D.

In the last five years a new symptom-group, indicating disease of the spinal cord has been independently observed and described by several physicians.

In 1873 I published under the somewhat unfortunate name of "tetanoid pseudo-paraplegia," five peculiar cases which I had studied in the three preceding years. I then defined this "peculiar paraplegiform affection" as follows: "This form of false paraplegia (using the word as implying the existence of paresis or akinesis in the lower limbs) is characterized by impairment of the functions of the lower extremities, when the patient is in the erect posture, without any loss of power in these parts. Further analysis show that the seeming paraplegia is dependent upon tonic spasm of the muscles of the lower limbs, as negative characters we have absence of the symptom ataxia, and often, also, preservation of sensibility."

Possibly I may be pardoned for claiming that this paragraph contains, with some errors, the essence of the symptomatology of the condition now under consideration.

In May, 1875, Prof. W. Erb, of Heidelberg, who had not seen my essay read, a paper before the Association of Physicians for Nervous and Mental Diseases held at Heppenheim,² upon a condition of spasmodic spinal paralysis, in which he describes cases of

paresis of the lower limb complicated with stiffness and even contracture of the lower limbs, without anæsthesia. In this paper he gave a description of the "spastic walk," in terms not very different from those I used in 1873; substantially the same essay was reproduced shortly afterward in the *Berliner Klinische Wochenschrift*, and since the condition of spastic spinal paralysis has had a place in nosology. It has not been noticed in the various articles upon tetanoid paraplegia that, in his Treatise on the Diseases of the Nervous System, (preface dated March 10th, 1876), Prof. Hammond³ described this rigid paralysis, and referred to Türck's and Charcot's pathological observations in cases of sclerosis of the lateral columns. He accepts the symptom-group as a natural one.

In 1876, Prof. Charcot⁴ of Paris, who had observed the symptoms before becoming acquainted with Erb's work, delivered one or more clinical lectures upon the subject, calling the affection *Tabes dorsal spasmodique*.

In the same year Charcot's views were re-iterated by one of his pupils, J. Bétous, in his inaugural dissertation.⁵

In both these publications the opinion is expressed that the symptoms which I prefer to designate as tetanoid paraplegia, are caused by primary disease of the lateral columns of the spinal cord, a form of sclerosis, either of the disseminated or of the systematic type.

This proposition of Charcot's was based upon an autopsy in a case of so-called hysterical contracture, in which he had found⁶ symmetrical sclerosis of the lateral columns, and upon the results of two autopsies by Ludwig Türck⁷ in 1856. Unfortunately, the notes of these cases are not of such a nature as to afford us any aid in the study of the symptom-group under consideration (ERB).

In 1877, Prof. Erb wrote a more elaborate essay upon the symptom-group in question, which he then designated by the term spastic spinal paralysis, and which he, following Charcot, believed to be due to primary sclerosis of the lateral columns of the spinal cord. More recently still, in Vol. XIII of the American edition of Ziemssen's Cyclopædia, he has reiterated his views unchanged.

Since Erb's and Charcot's first publications, numerous contri-

butions to the literature of the subject have appeared, among which I may name O. Berger,⁹ F. Richter,¹⁰ Seeligmüller,¹¹ R. Schultz,¹² M. Rosenthal,¹³ Stofella,¹⁴ and L. C. Gray (of Brooklyn).¹⁵

These writers have, with little or no qualification, accepted the Erb-Charcot views of tetanoid paraplegia.

Two eminent physicians have, however, protested against these views as too exclusive ; as tending to elevate the symptom-group to the rank of a well-defined disease. These are Profs. Westphal¹⁴ and Leyden.¹⁵ Prof. Westphal relates in the *Charité-Annalen* an extremely interesting case of paraplegia with rigidity, a little diminution of sensibility and marked numbness in the lower extremities, without cystic or rectal paralysis. This patient had recovered almost perfectly at the date of writing the report (July, 1877). Assuming that the symptom-group in this case was similar to the spastic paralysis of Erb, Dr. Westphal proceeds to state his belief that paraplegia with rigidity may be produced by a variety of spinal lesions ; especially in his experience, by early and unrecognizable Pott's disease of the vertebræ. This last statement is in remarkable accord with the pathology of my own cases, three out of five having been of this nature.

Prof. Leyden has very lately ably reviewed the subject in its various relations in a paper read to the Berlin Medico-Psychological Society.¹⁶ In this communication, while admitting that sclerosis of the lateral columns may be primary, and that this lesion will probably cause rigidity of the limbs below the lesion, he maintains his former position,¹⁷ to the effect that "spastic paralysis" often is the expression of a chronic dorsal myelitis. Experience since 1875 has convinced him that many spinal lesions may cause "spastic paralysis," as (1) traumatic myelitis, (2) compression of the spinal cord by Pott's disease or by tumors, (3) spontaneous chronic myelitis (disseminated sclerosis involving the lateral columns), (4) spinal paralysis after acute disease, (5) syphilitic paralysis, and (6) spinal meningitis or peri-myelitis.

Leyden proposes a clinical sub-division of spinal paralysis into two classes, supple or atonic paralysis, and tonic or spastic paralysis.

The latter form (including the Erb-Charcot symptom-group) is explicable upon three hypothesis: (1) from increased excitability of motor nerves, (2) from increased excitability of the sensory roots of nerves, and (3) by partial or total interruption of the voluntary conduction from the brain to the periphery, with increased reflex power of the spinal gray substance. He lays the greatest stress upon the last-named explanation, which has a physiological basis in the experiments of Goltz (inhibitory action of the brain upon the spinal cord). I gave this explanation of the spasm in my cases in 1873. Another recent critic of the Erb-Charcot proposition, Dr. Ricklin¹⁹ of Paris, has pointed out that a number of cases of so-called spastic paralysis, in the essays of Richter, Berger, Schultz, and even Erb, might be looked upon as irregular cases of myelitis. He even objects to Stofella's case with autopsy, because of the absence of microscopic examination, and of any statement as to the condition of the upper spinal cord, mesocephale, and brain. Westphal and Leyden suggest that many of the cases of spastic paralysis now recorded are cases of localized (dorsal) myelitis, with secondary degeneration of the lateral columns below the lesion. It has been impossible for me to read Berger's⁹ and Seeligmüller's¹¹ contributions in the original, but with respect to Richter¹⁰ I can say that his cases are much more like partial myelitis, or meningo-myelitis, than like spastic paralysis. Especially is this true of his case No. 4, which he reports as almost cured by electricity and hydrotherapy. Schultz¹² in his report, prepared under Erb's supervision, relates two cases (out of four) which are confessedly not typical.

Nothnagel,²³ recognizing the general characters of a spastic case occurring under his observation (1876), relates it under the title of *dorsal myelitis*.

A survey of the literature of tetanoid paraplegia would be incomplete without a consideration of a functional form of it, first described by Dr. L. A. Sayre of New York, under the somewhat extraordinary name of spinal anæmia. His first paper was published in 1870,²⁰ and a second fuller exposition of his views was presented to the New York Society of Neurology and Eletrology,

March 1st, 1875, and printed in the transactions of the American Medical Association for 1875. In these publications Dr. Sayre has described a form of spastic paralysis occurring in children, characterized by spasm of the adductor muscles of the legs, and of some muscles of the hands and arms, by paresis, and by a degree of incoördination. In many cases apparent idiocy was present, the clitoris and penis in these little sufferers were found red, irritable, and touching them produced local excitement and strong spasm in the limbs and body of the patients. Excision of the clitoris, circumcision, or simply tearing off and turning back an adherent prepuce, is reported to have wrought magical improvement in all, and a cure in most of the subjects.

Dr. Sayre quotes (Transactions of American Medical Association, 1875) Dr. Barwell of London, in such a way as to lead one to suppose that the latter observer had met with cases of spastic paralysis dependent upon sexual irritation. A reference to Barwell's lecture²¹ will show that he described *paresis* and *paralysis* in such cases, and not contracture, spasm or incoördination. Dr. Sabal of Jacksonville, Florida, has met with cases like Dr. Sayre's, and has been successful in their treatment.

While recording these statements as to the existence of a functional tetanoid paraplegia, it should not be forgotten that Dr. Eugene Dupuy²² now of San Francisco, has said, "Dr. Sayre has lately recorded some very interesting cases of contraction in young children which gave way entirely after the operation for phymosis. In some cases operated on by Dr. Sayre, the relief has not been of long duration, if I am to judge from what I have seen, as some of those young patients have been under my care since the operation performed by Dr. Sayre, and are as yet suffering as much as before from the same troubles." Even if we accept this statement of Dr. Dupuy, it seems probable that a functional spastic paralysis may exist. There is certainly nothing in physiology or in laws of morbid reflex actions to make such a condition impossible *a priori*. I have, however, never met with such a case either before or after an operation. As to Dr. Sayre's theory of spinal anæmia it is hardly worthy of discussion, and I infer from the wording of his

articles that he himself does not attach much importance to it.

To conclude this clinical study of tetanoid paraplegia, I would briefly state my experience since writing my paper in 1873.

In the first place, I believe the facts therein stated to have been well observed, though perhaps I may have overlooked paresis in some of my patients. In some of them, it is positively stated that while recumbent, their resistance-strength at the knees was normal. Case III was recognized as a case of amyotrophic lateral sclerosis (Charcot) not long afterwards, and a complete post mortem examination which I have recently finished, has proved the correctness of this diagnosis. My explanation of the genesis of spasm is yet, I believe tenable, and the chief error I am willing to admit is having too hastily drawn the conclusion that tumors compressing the cord were the anatomical cause of the symptoms. A more critical examination of Case IV might have saved me from this error, as it was evidently a case of syphilitic myelitis in the dorsal region.

Second, I have met with several cases of dorsal myelitis (in accord with Westphal, Nothnagel and Leyden,) in which at a certain period well marked tetanoid paraplegia, or a spastic condition set in. One of these was case IV of my essay. Another was a young man (treated in consultation with Dr. Chas. McBurney in 1873-4,) who recovered from a very severe attack of syphilitic paraplegia, and who for a long time suffered from stiffness and awkwardness of both lower extremities, with increased reflex. This mild tetanoid state gradually wore away, and the patient has now been for several years perfectly well. A third case was also one of severe syphilitic paraplegia, from dorsal myelitis, in which recovery progressed to a certain point, and remained stationary in spite of remedies; the remaining symptoms being marked anæsthesia, paresis, great rigidity of the legs, especially when patient stood and tried to walk with crutches. Then the legs and feet were held tightly together in adduction, and only a violent effort enabled the patient to take a small step. Various forms of increased reflex were observed in this patient. A fourth case now under observation is that of a lady twenty-eight years of age, who in 1874, after con-

fine ment, had a severe complex illness in which myelitis played a part, and was paraplegic for several months. Since has had weak and numbish legs, with abnormal reflexes, especially of bladder and rectum. Her walk is done with small steps, the legs being very rigid ; no dragging of feet, no loss of equilibrium when standing with eyes closed ; legs strong enough when tested in bed ; knee and sole reflexes are very strong.

Still another case is one of destructive central myelitis of the cervical enlargement ; characterized by atrophic paralysis of the hands, forearms, and one shoulder ; absolute anæsthesia up to the middle of the arms, partial anæsthesia of shoulders and parts of neck ; contraction of the left pupil, and tetanoid state up to the left lower extremity, without anæsthesia or atrophy. This tetanized leg is on the same side as the greatest atrophy and the contracted pupil

In the third place I have seen several children with stiffened, contracted, adducted, and incoördinate limbs (upper and lower), co-existent with defective cerebral development. In other cases the legs alone were stiffened and adducted, and there were no symptoms in the upper extremities or head, and no sexual irritation.

Dr. Erb²⁴ has recently described similar infantile cases, in which the legs alone were weak and tetanized, without alteration of sensibility. At the present time I have a fairly well-marked instance of the symptom-group in a child of six years attending at my clinic.

From a careful consideration of the above data, I think that the only safe conclusions to be drawn now are :

1. There is possibly a *disease* worthy of being called primary sclerosis of the lateral columns, and characterized by tetanoid paraplegia without anæsthesia, ataxia, atrophy, or affection of the bladder (Erb-Charcot view).

2. There is very certainly a tetanoid paraplegia indirectly produced by various lesions of the spinal cord, as pressure-effects (Leyden and myself), syphilitic and non-syphilitic myelitis in the dorsal region (Leyden, Westphal, Nothnagel and myself), amyotrophic lateral sclerosis (Charcot, Leyden and others), traumatic myelitis (Leyden), disseminated nodular sclerosis (Charcot—Case

IV of Bétous' essay). Besides, the wonderful resemblance between the one-sided phenomena of late contracture in hemiplegia of cerebral origin and tetanoid paraplegia must be borne in mind.

3. It is probable that a functional tetanoid paraplegia exists in children, caused by genital or other peripheral irritation (Sayre).

4. It is possible that tetanoid paraplegia cervicalis in young children may be due to defective cerebral development, and consequent agenesis of certain tracts in the cord. This is rendered probable by at least one case which has come under my observation, and by a consideration of the hemi-spasm which follows grave cerebral lesions, and which we designate late contracture.

If we now turn to pathological anatomy, we obtain instructive information.

1. In the "true" spastic paralysis, Charcot and Erb claim that there is a primary sclerosis of the lateral columns of the cord. The opinion is based upon five autopsies, three by Türck,⁷ one by Charcot,⁶ and a more recent one by von Stofella of Vienna.¹⁴ The claims of these autopsies to the rank of demonstrations is contested by several, especially by Ricklin.¹⁹ The objections are that Türck's and Charcot's examinations were made in cases whose symptomatology was not well recorded, or was that of another disease (hysterical contracture—Charcot). The last case, even though the autopsy was witnessed by Prof. Klob, is unsatisfactory, because (1) no microscopical examination was made; (2) nothing is said of the state of the upper spinal cord, medulla, pons, and brain, and (3) it is stated that the sclerosis (of the posterior part of the lateral columns) grew less and less in the cervical region.

2. In the case which Charcot and Bétous took for spastic paralysis, and which was found to have been disseminated sclerosis, numerous nodules were found in the lateral columns.

3. In the late contracture of hemiplegia, which produces symptoms so much resembling tetanoid paraplegia, we now know beyond question that there is degeneration of the posterior part of the lateral column—the crossed pyramidal column of Flechsig.

4. In the various diseases of the spinal cord which, in the experience of many observers besides myself, have been accompanied or followed by a tetanoid state, we have good reason to believe that there was secondary descending degeneration of the crossed pyramidal column. For example, in my case of cervical myelitis with stiff left leg, it can hardly be doubted that the left lateral column (crossed pyramidal column) has undergone a degree of degeneration.

From the above it appears almost certain that lesions of the crossed pyramidal columns have much to do with the development of tetanoid paraplegia, though we as yet lack a demonstration of the existence of a *primary* sclerosis of these parts.

A few months ago I should have been disposed to make the relation between sclerosis or degeneration of the lateral columns (crossed pyramidal column) and the tetanoid state of the limbs one of imperative causation, but since then, Dr. J. C. Shaw of Brooklyn, has exhibited preparations of the spinal cord of a patient who had progressive muscular atrophy without a trace of stiffness of the limbs, and in the specimens there exists degeneration of the ganglionic bodies of the anterior horns, and well-marked sclerosis of both crossed pyramidal columns. This sclerosis of the lateral columns was at least as well-marked as in my own case of amyotrophic lateral sclerosis, in which the contracture was extreme. This rather puzzling case of Dr. Shaw's is published in the January number of *Fewell's Journal of Nervous and Mental Disease*, of this year. Quite a number of cases of amyotrophic lateral sclerosis in which sclerosis of the lateral columns was found without there having been any rigidity of the muscles are on record. Chief among them are those by Duménil, and by Barth.

With the treatment and prognosis of tetanoid paraplegia, this review can have nothing to do. I would, however, remark that several cases have been cured, including one which was recently reported from Kussmaul's clinic at Strasburg, by Velden.²⁵

The question of priority of description of the symptom-group tetanoid paraplegia, of first claiming that there is a paraplegiform

affection chiefly characterized by spasm, is one of minor importance, and I am quite ready to submit my claims in the language of Prof. Leyden,¹⁷ "*Weniger bekannt ist, dass auch Séguin die spastische Paralyse als eine besondere Form geschildert hat, unter dem etwas schwerfälligen Namen der Tetanoid Pseudo-Paraplegia.*"

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NEW BOOKS AND INSTRUMENTS.

Allgemeine Psychopathologie zur Einführung in das Studium der Geistesstörungen. Von Dr. H. EMMINGHAUS, Docenten an der Universität Würzburg. 8vo, pp. 471, Leipzig, 1878.

The researches made within the last decade in the field of mental pathology, have been registered in so many separate monographs, that the student will appreciate any attempt to collect and compare their scattered and often discordant results in a single volume. This attempt has been made, and with a fair degree of success, by Dr. Emminghaus, who in the work before us introduces the subject of insanity in its general aspects. In the introductory chapters, mental pathology is assigned its proper place as a branch of general pathology, and it is consistently claimed that the anatomical field of the mental pathologist lies in the prosencephalon. Under the head of general nosology, the various clinical methods of diagnosis are enumerated, and their importance is insisted upon, but we think that the author's omission of describing *how* such instruments as the electric battery are to be employed, will be seriously felt by those who turn to his work for accurate information. Otherwise the subject is very thoroughly dealt with, and discussed not only from its clinical and pathological, but also from its ethnological and anthropological points of view. A clear parallelism is drawn between mental and somatic symptoms, and in analyzing the various forms of mental aberration, more prominence is justly given to the anomalies of association of ideas than we have been accustomed to find in works on

this subject. The possible causes of insanity are arranged in a clear and concise manner, and the author happily states that, as a rule, it is not so much any single cause, as the *cumulative* effect of several causes, which determines the production of mental disease.

The bibliographical references are copious, and it is suggestive of the state of psychiatry in our country, that only a single American writer has been quoted, and he in no less than seven different places (Rush), while the articles in the *American Journal of Insanity* are entirely ignored.

One objectional feature of the book is, that discrepant views are not infrequently quoted side by side, without any criticism on the author's part. Thus we hardly understand how the grossly superficial and empirical opinion of Fothergill and Benedict, that the moral sense was located in the occipital lobes, could be incorporated with other and scientific statements as to the cortical localization; nor does anything in the writings of Weiss justify his being mentioned in the same breath with Meynert or Spamer.

There are also many evidences of carelessness in his pathological chapter. Thus on page 395 he states that the microscopical changes of the nerve fibres of the cortex as well as of the contiguous white substance, are on the whole *the same* as those of the nerve cells; and further on (p. 401) he refers the œdema of the cortex in certain cases to its deficiency in "fats," although it is now well established that, normally at least, the brain contains no true "fat."

Although the author is an advocate of classifying insanity in its various clinical forms, on the principles enunciated by Kahlbaum, Meynert and Voisin, yet he is not as outspoken as in justice to the subject we could wish him to be. No doubt the asylum-conservatives of Germany, under the leadership of Roller and Fleming, exercise a pressure on the younger alienists in regard to this important question; but all the more necessary is it, that a work which professes to guide the beginner, should endeavor to counteract this influence!

On the whole, however, this work fairly represents the extent of our knowledge in the interesting though difficult field with which it deals. It is fully up to the time, and since its author has based such portions of his work as are necessarily speculative on the researches of Flechsig, Hitzig, Meynert, and Wundt, it can be safely asserted that he has furnished a safer guide to the student than is furnished by any of the now antiquated text-books in the market.

The Principles and Practice of Surgery. By D. HAYES AGNEW, M.D., LL.D., Professor of Surgery in the Medical Department of the University of Pennsylvania. Vol. I, pp. 1062. Lippincott & Co., Philadelphia. 1878.

This volume is issued as "the first part of a work on the Principles and Practice of Surgery," and treats of inflammation, wounds, injuries of the head, extremities, chest and abdomen, diseases of the abdomen, and injuries and diseases of the blood-vessels and osseous system, together with chapters on diagnosis, ligation of arteries and dressings. By its size, scope and fulness of detail, it is raised above the class of text-books and manuals, and brought into that of general treatises or systems. The work bears upon every page the evidence of the author's industry, learning, conscientiousness, careful and prolonged observation, large experience, and the courage of his opinions, and it is undeniably superior in many respects to the works on general surgery that have issued from the American press. But while recognizing all these facts and admitting that Prof. Agnew has spent twenty-five years upon his task, the question still arises whether the time has not passed for any one man to make a systematic treatise on a science so vast as that of modern surgery. It requires an amount of physiological, pathological, and theoretical knowledge, the acquisition of which seems incompatible with the amount of personal experience of practical details needed to give a man a magisterial attitude with regard to questions of practice. One man might do it if, relieved from the labor imposed by necessity, or by a laudable ambition in another line, he could spend his time in the hospital, dead-house, and laboratory; but the difficulties under which a surgeon in full practice must labor, are indicated not only in that sentence of the preface in which Prof. Agnew says the pages "were written in moments stolen from the hours usually allotted to repose," but also in the evidence borne by many of these pages to the fact that he has accepted a sort of "coaching" upon some physiological and pathological subjects which could be treated satisfactorily only by one who brought to them the same study and experience which have given him his authority upon other more purely surgical subjects.

May we not ask if any man has the right to speak positively, as a teacher, concerning the nature of inflammation, the formation of tissue, the origin of pus, and the character and function of leucocytes, who does not bring to their consideration the results of much personal study, observation, and experiment upon them.

The objection is not a new one, and it has found expression elsewhere in the association of several authors to produce one book. An example familiar to all is Holmes's System of Surgery; another is the late edition of Mr. Bryant's very valuable surgery, to which Mr. Maxon has contributed on pathological questions, and still another in the not so valuable surgery by Gant.

The chapters on inflammation and wounds are those to which this objection is principally addressed, and we desire to except from it the description of repair after fracture, which is admirable in every respect. For the treatment of the details of the subject of inflammation we have nothing but praise. The same industry and thoroughness which mark the rest of the work are found here, and in its history, its account of the growth of our knowledge of the subject, the presentation of acquired facts and their analysis, the chapter compares favorably with others. But the central idea, the representation of inflammation as a disease, with causes, symptoms and treatment, is a submission to authority or tradition which perpetuates what we must consider a radically incorrect conception of it, involves the writer in contradictions and inconsistencies, and leaves the student bewildered and perplexed. The very classification of the varieties of this "disease" as *healthy* and *unhealthy*, in the second page of the chapter brings out the incongruity very sharply, and is followed by an explanation or justification which cannot be accepted as satisfactory. In his analysis on page 55, Prof. Agnew defines inflammation as hypernutrition; if he had gone one step further and substituted the definition of nutrition, for that term his equation would have read "inflammation is an increase of the process of repair." This increase may be called forth by a corresponding increase of normal molecular waste or destruction, as after exercise, or by a localized destruction as in a wound. In the two cases the processes are identical; in the one the increase is generalized and slight, in the other it is localized and notable. The increase of the temperature of the body after exercise is not a fever, and yet it is identical in its nature with the localized increase about an injury; in both cases it is the heat set free by those chemical combinations in the tissues, which are the essence of vital action, and in both cases the increased chemical action is called forth by the needs of the body. This action is the *vis medicatrix naturæ* to which he refers, and which he paraphrases so well as "the force which resists destruction and tends to conserve and restore." When this force is dominant he speaks of the process as *healthy*, when it is overmastered as *unhealthy*. But

surely the process is the same whether it is victorious or defeated, and instead of classifying it according to the power of its antagonist we should carefully distinguish between them. The normal process of nutrition is accompanied by the production of substances which, if not promptly cast out, are deleterious to the organism, but we do not call nutrition a healthy disease when all is going well, and an unhealthy disease when the lungs or kidneys are out of order and unable to eliminate excrementitious products. The same exercise which promotes the health of one individual, kills another, but it is the disabled lung or heart that is responsible for the death, not the stimulated chemical changes. In like manner the local hypernutrition which under favorable circumstances repairs a wound, is not responsible, under other circumstances, for the sloughing of the edges of the wound, or for the occurrence and spread of "inflammatory" complications. The productive osteitis which repairs a fracture may exceed the necessary limits and cause necrosis by strangulation of the vessels in the Haversian canals, but the process is not a disease, and the necrosis is only an incident, an evidence of the excess or ill-regulation of the effort made by nature, just as under other conditions it is an evidence of the insufficiency of that effort. Nature in the blindness of her action has done harm while doing good, but the process is a healthy one even if excessive.

We believe that much of the difficulty which surrounds the study of this subject would be removed by a restriction of the use of the term inflammation, by a discrimination between the process of repair and the complications so frequently associated with it, and by a refusal to attach to the former, at least, the idea of a disease.

We have left ourselves no space for the consideration of the rest of the volume. Its general plan needs no comment, and as we cannot enter fully into the details, it would be ungracious to pick out the occasional flaws for mention where there is so much to commend. A word is required, however, by the explanation given of the mode of healing of arteries after ligation, for it involves too many disputed questions, and is too radically opposed to the views held by leading pathologists to be accepted on the scanty evidence presented here. We will also add that free use has been made of the valuable records of the Surgeon-General's office.

[L. A. S.]

The Localization of Cerebral Disease. Being the Gullstonian Lectures of the Royal College of Physicians for 1878. By

DAVID FERRIER, M. D., F. R. S. 8vo, pp. 142. G. P. Putnam's Sons, New York, 1879.

As the celebrated author before us states in his preface, these lectures are intended to serve as a clinical and pathological supplement to his well-known work on *The Functions of the Brain*. Not only does he in it apply the test of clinical experience to the doctrine of which he is a prominent expounder, but the little volume gains additional interest from the fact, that it discusses the oft-quoted objections of Brown-Séquard and his pupils against that doctrine. He succeeds in proving satisfactorily that many of these objections are fallacious, and disposes of one of Brown-Séquard's chief arguments in the following forcible manner: "We should think it in the highest degree absurd, if anyone were to ascribe a case of sudden death, in which the only discoverable morbid appearance was a boil on the neck, as a case of sudden death 'seemingly caused' by a boil on the neck; for the obvious reason that such a lesion is not usually followed by a fatal result. So, if we have abundant evidence to show that a certain part of the brain may be diseased without causing any motor paralysis whatever, it would be no less absurd to describe a case of facial paralysis, in which some lesion of this region was the only discoverable anatomical change as a case of facial paralysis 'seemingly caused' by this lesion. Causation must not be invoked where the facts do not warrant anything beyond co-existence or fortuitous collocation." He also justly claims that the majority of cases quoted as militating against his views by Brown-Séquard, are badly observed and worse registered; and for the few reliable instances, in which hemiplegia is associated with cerebral lesion of the same side, he adopts the explanation suggested by Flechsig, that these exceptional cases depended upon variations in the pyramidal decussation.

As a general thing it may be stated that Dr. Ferrier's last work bears evidence of far more careful study and critical analysis than any of his previous writings, just as his more recent experiments are free from that crudeness of which his earlier ones have been not unjustly accused. He seems to us to have successfully maintained the correctness of the principle of cortical localization, and does not hesitate to strongly denounce both the spirit and subject matter of Schiff's objections thus: "Frog and pigeon physiology has too often been the bane of clinical medicine, and tended to bring discredit on a method of investigation, which, if used

properly, we must regard as the sheet anchor of accurate biological and therapeutical research" (p. 8).

He also accepts the challenge of Dr. Dupuy with regard to the Massachusetts crowbar case, and converts this case from a weapon against to a weapon for his doctrine, by showing first, that the crowbar did not injure the "motor region," and, secondly, that the generally accepted impression that the patient manifested no abnormal mental phenomena after the accident, was an erroneous one. Every one will agree with the author, that it would be hasty, and injurious to the theory of cerebral localizations, to make pathological evidence carry more than it can legitimately bear, and to base therapeutical measures on regional indications prematurely.

The body of the book deals with various lesions, destructive and irritative, of the motor and sensory areas of the cortex, selected from the recent literature of the subject. Without adding anything new, Dr. Ferrier has collected and arranged them in a proper order, and intelligently summarized the inferences which can be drawn therefrom. He has omitted, however, many interesting instances to be found in our own and the German archives, notably the extensive and accurately reported series of Seguin, presented before the American Neurological Association in 1877. Over fifty diagrams of the cerebrum (after Ecker) are introduced, on which the various lesions are marked by shade-lines, giving a clear idea of their situation and extent. Some of the cases figured do not seem to have been sufficiently limited in extent to warrant any certain conclusions respecting them, as, for example, the one represented in Fig. 45, where nearly half the convexity of the hemisphere was involved. Dr. Ferrier also seems to us to be over-arbitrary, when, on p. 117, he states that Munk's cases of lesion of the occipital lobes associated with blindness, "will not bear examination." If the author's reason for so doing is founded on nothing stronger than the discrepancy between Munk's clinical experience with human beings, and his own experimental experience with monkeys, his doubt is not a valid one. Dr. Ferrier, in treating of lesions in the centre of Vieussens, suggests the nomenclature proposed by M. Pitres. We fail to see anything that is either expressive or well-chosen in this nomenclature, nor do we find the figures copied from Pitres' work by Ferrier to be all correct. Not only are the longitudinal fasciculi and the layers of the ansa peduncularis entirely disregarded, but in figure 20 we find reference number ten to read "nucleus caudatus," whereas it is

the posterior thin edge of the lenticular nucleus, inaccurately represented as it is. It also seems to us that such terms as ascending frontal convolution, *pli courbe*, and the like, might be advantageously abandoned, and replaced by the nomenclature of Ecker, or Wernicke-Meynert.

On page 99, Ferrier refers to the interesting observation of Callender, that in many instances of localized cerebral lesions, pain was experienced over the spot affected, and states that where spontaneous pain was absent, it could be brought out through percussion. It would have been very desirable to know whether in these cases the lesion was purely cortical, or whether the meninges were not also involved. We can hardly believe that Dr. Ferrier assumes *cortical* pain to be localized by the patient.

On the repudiation of Ferrier's earlier experiments by Hitzig, the real originator of the doctrine of localization, the former is silent, nor does he notice many of the perfected results of the German investigator. Under the circumstances, we must confess that Hitzig's complaint, that Ferrier is tacitly permitting the English-speaking scientific world to consider himself as the founder of cerebral localizations, is a not unjust one. In the diagrams of the monkey's brain, the "centres" of Ferrier still seem to be suspiciously numerous, and if he had paid due attention to the experiments of Fürstner, he would have learned to appreciate that source of error from which his most recent conclusions are not entirely free. Fürstner found that if an area A was irritated by a current repeatedly, so as to produce a "psycho-motor" reaction, the subsequent irritation of the area B, which, previous to the irritation of A, was shown not to respond at all, will now give the same reaction as A; certainly an important and noteworthy result.

The lectures are well and interestingly written, the facts are concisely stated, and elucidated by the numerous clear diagrams. Those desirous of obtaining as fair an exposé of the practical and biological merits of the doctrine of localization as the English literature contains, will find it in the little volume before us.

[E. C. Sp.]

The Diseases of the Bladder and Urethra in Women.

By A. J. C. SKENE, Professor of Diseases of Women in the Long Island College Hospital, etc. N. Y., Wm. Wood & Co., pp. 375
1878.

The first feeling which the appearance of this book will be likely to excite, will be one of wonderment, that so bulky a volume could be written on so apparently insignificant a subject. But to

those whose lot it has been to treat these maladies, and who have experienced the difficulties which present themselves at every step the wonderment will not be so great. No class of diseases gives as a rule, more anxiety, worry and real suffering to the patient, or requires more skill, patience and extent of resource in the medical attendant.

Up to the present time there has been no text-book treating specially of this subject, and the want of it has been very greatly felt, not only by the practitioner, but by the specialist. Diseases of the bladder have been generally omitted from the text-book on diseases of women, and the aspect of these diseases as found in women have been but imperfectly presented in the standard works on genito-urinary diseases. That Dr. Skene's book comes then in good time, and if up to the mark, is sure of a cordial welcome is quite evident. Let us see how far it deserves the welcome.

Six of the eight lectures of which it is composed, and which were originally delivered to the medical class at the college, are devoted to the diseases of the bladder, and the remaining two to the urethra.

Chapter I, treats of the anatomy of both organs, and gives a sufficiently clear account of this somewhat unsettled region. As regards the much disputed question of the sphincter of the bladder, the author inclines to the view, which holds that all sphincteric action is due to the folds of the mucous membrane which close over each other. This view is the one now adopted by many of the best authorities, although certain functions are hard to explain on this hypothesis. In the account of the congenital malformation of the bladder and urethra, we miss any account of Emmet's operation for the formation of an urethra in case of its absence. This operation Dr. Emmet has recently again performed in a case of congenital absence of the urethra with apparently good results. We hope to lay the details of this case before our readers in a future issue. The operation described by Skene does not give retentive power, but necessitates the wearing of a urinal, while Emmet's operation not only gives retention, but so complete is the retention that it necessitates the use of a catheter; the patient having neither the desire nor ability to pass the water naturally.

Functional diseases of the bladder are made to include not only paralysis, incontinence, etc., but also functional disorders from anomalies of position, cystocele and the like. This chapter is quite full and exhaustive, and treats very satisfactorily of this class of diseases, including as it does, some of the most troublesome and

rebellious affections anywhere to be met with. We wish the diagnosis between the two forms of nocturnal incontinence, the anæsthetic and hyperæsthetic had been made a little clearer. A correct diagnosis is very important as a guide to the proper treatment.

For the relief of cystocele, a new form of pessary is shown which, while it will probably do its work very well, and we have Dr. Skene's testimony to this effect, can never come much into use, from the difficulty of its introduction, requiring as it does the use of a Sim's speculum. Another disadvantage is the fact that the patient cannot in case of necessity, very well remove it herself. The operation for cystocele evidently does not meet with much favor in Dr. Skene's hands.

In the remarks of the microscopy of the urine we notice one very sensible assertion or rather caution, which is: "never attempt to locate the seat of an inflammatory trouble from the character of the epithelium alone." The text-books as a rule, are very misleading on this point, giving one the idea, that the epithelial elements from the different parts of the urinary tract are so distinctive, that their original seat can at once be told by their shape. An idea we have repeatedly satisfied ourselves is not true.

The introduction of "an endoscope which to the investigator of bladder and urethral diseases has proved to be what Sim's speculum is to the gynæcologist," is certainly a great, a very great step in advance. If the author's claims for his instrument are sustained by other investigators, he may be hailed as one of the benefactors of his race. Having had very little experience in the use of the instrument, we cannot speak of its practical worth from our own knowledge. It must be tried however, upon its merits, and in the meantime the verdict of the profession must be awaited. That it will never come into common use is quite evident, for like the ophthalmoscope and other instruments of precision, only those having extensive clinical advantages, will ever attain sufficient skill and experience to properly and understandingly use it. For the diagnosis of certain diseases, as for instance fissure of the bladder, it promises to be invaluable.

The chapter on cystitis, which is of course the central point of the book, is complete and exhaustive; detailing all the modern plans of treatment fully and satisfactorily. In speaking of the physical exploration of the bladder and dilatation of the urethra, scarcely enough stress is laid on the advantages to be derived in the way of diagnosis by the passage of the finger. Due caution however, is urged in practicing this operation, least as has hap-

pened several times to distinguished operators, permanent incontinence should result.

The article on new growths both of the bladder and urethra is good, and that on diseases of the urethra well worthy of careful study, especially the portion devoted to fissure of the neck of the bladder, where many new and interesting facts are related.

On the whole, the book gives the impression of having been written by one who has made the subject of which he treats an object of special and careful study, and who knows from a large experience whereof he writes. It is full of suggestions and new inventions to meet special requirements; and we can heartily recommend it to our readers as being a good, reliable and sound guide in the management of the diseases of the bladder and urethra in women.

The get-up of the book is good, the wood cuts are fair, but not all of them as good as could be desired, nor as good as the pre-eminence of American workmen in this department should lead us to expect.

[M. D. M.]

Pathological and Practical Observations on Diseases of the Abdomen. Comprising those of the Stomach and other parts of the Alimentary Canal, Œsophagus, Cæcum, Intestines, and Peritoneum. BY S. O. HABERSHON, M.D. Third edition, 8 vo., pp. 706. J. and A. Churchill, London, 1878.

This is a third edition revised and very much enlarged, making an octavo volume of some seven hundred pages, and in it the author has attempted a description of all of the affections of the alimentary canal, beginning with the diseases of the tongue, mouth and pharynx. The book, however, is wanting in many respects. No mention is made of the topography of the stomach or of the other parts of the alimentary canal, and very little is said about physical examination. Kussmaul's treatment of dilatation of the stomach and gastric catarrh, receives only a passing notice, and the writings of Leube and Ziemssen are not even referred to. The few pages devoted to ulcer of the stomach are the best in the work, but no reference is made to the very great importance of rectal alimentation in the treatment, although Balthazar Foster showed its value and practicability years ago. Indeed, the omissions in reference to important advances in diagnosis and treatment, might be greatly multiplied if our space permitted and the book will be chiefly valued for the many interesting cases which

it contains. In ulcer of the stomach the author has been very fortunate in the number of observations, where he has found branches of the pneumogastric exposed in the floor of the ulcers, or included in the indurated edges of the ulcers, and where during life pain has been a very prominent symptom, for although these conditions have been supposed to exist in explanation of the pain in the ulcers of the stomach, the number of observations where such conditions have been found are few. He also reports cases where the pain has been severe, and where it has suddenly ceased and at the necropsy, the nerve supplying the ulcerated district has been separated from its central connections by sloughing. In conclusion, we should say that this is not a book for the working library of a physician, but should be found on the shelves of all consulting libraries.

Apparatus for the Clinical Estimation of the Hæmoglobin in Blood.

Dr. Gowers at a meeting of the Clinical Society of London, December 13th, 1878, exhibited this apparatus which is believed to be as exact, simpler and more convenient than any yet made. The color of blood diluted with distilled water, was taken as an index to the amount of hæmoglobin, and the fact that for twelve or twenty-four hours, the dilution underwent no change and that the deposit was colorless, showed that all the hæmoglobin was rapidly dissolved out by the distilled water. As a standard, a dilution of one hundred times was taken, twenty cubic millimetres of normal blood in two cubic centimetres of water. The same volume of the blood to be tested was diluted until its tint was the same as the standard, the degrees of dilution necessary for this, indicated the relation the hæmaglobin bore to that of normal blood taken as 100. Thus, if a dilution of fifty times gave the same tint as that of the normal blood diluted 100 times, the amount of hæmoglobin was just fifty per cent. of the normal. The apparatus consisted of two tubes in a small stand, both tubes of the same diameter. One contained the standard which, for stability was glycerine and gelatin, tinted with carmine and proto-carmine to the exact tint of the dilution of normal blood, (1 in 100). The other tube was graduated; 100 divisions=two cubic centimetres; each degree therefore=twenty millimetres, a capillary tube holding twenty cubic millimetres, a bottle with pipette, stopper, and a guarded needle, completed the apparatus. In use, a drop or two of distilled water was placed at the bottom of the graduated tube; the twenty cubic millimetres of blood were then measured and

mixed with the drops of water ; more water was then added until the tint was the same as that of the standard. The amount of water added, indicated by the numbers on the divisions, showed the percentage of color, *i. e.*, of hæmoglobin compared to the normal. A specimen of healthy blood was shown, in which the tint of the standard was only reached by 105 dilutions, and a specimen of blood from a case of anæmia, of which the same volume of blood gave the test of standard at twenty-two dilutions, (22 per cent.), and at thirty dilutions the paler tint was distinct even by gaslight. The apparatus was made by Hawksley. (*British Medical Journal*, December 21st, 1878).

[McB.]

ABSTRACTS AND SUMMARIES.

The First Year of the Therapeutical Society of New York. By ANDREW H. SMITH, M. D., Secretary of the Society.

The Therapeutical Society of New York has recently completed the first year of its existence, and a summary of the work accomplished may prove not uninteresting to the readers of the ARCHIVES.

The fundamental idea in the organization of the Society was to concentrate the attention of the members upon definite therapeutical questions given out in advance. These questions were to be tested practically by the members as opportunity offered, and when a sufficient number of observations had been accumulated they were to form the basis of a report to the Society.

For greater convenience the work was divided among committees, as follows: On Anti-pyretics; on Neurotics; on Restoratives; on Surgical Procedures and Appliances, including topical Medication; on Electro-therapeutics; and on Materia Medica. Each member is expected to elect one or more of these committees with which he will serve. Observations are also solicited from persons who are not members of the Society, and a considerable number of such have been received.

It is hoped that in the course of time the Society will become a centre toward which therapeutical observations from all parts of the country will tend, and where they will be assorted, classified and tabulated for publication. Suppose, for instance, a practitioner, perhaps in a distant State, obtains success in a single case with some agent not heretofore employed for that purpose. He

may not consider the observation of sufficient importance to send to a journal for publication, but he transmits a brief sketch of it to this Society. It is referred to the appropriate committee, and at the next committee meeting it is discussed, and the mode of treatment is perhaps adopted as one of the topics for study by the committee. Observations accumulate more or less rapidly, until the committee are in possession of sufficient data to form the basis of a preliminary report. The publication of this elicits observations from a vastly widened circle of practitioners and the merits of the treatment are thus tested upon an extended scale.

During the past year reports have been made by different committees as follows :

I. REPORT BY THE COMMITTEE ON ANTI-PYRETICS, Dr. A. Jacobi, Chairman ; a report on *Pilocarpia*. This report was based upon more than sixty carefully observed administrations of the drug, including several physiological experiments. The affections for, or in which pilocarpia was given embraced simple catarrhal fever, muscular and articular rheumatism, lumbago, sciatica, acute bronchitis, chronic bronchitis and emphysema, phthisis pulmonum, onanism, ichthyosis, acute nephritis with acute pulmonary œdema, amyloid degeneration of kidneys, cirrhosis of liver, hydrops from mitral incompetency, empyema, convalescence from intermittent fever and from entero-colitis

The conclusions reached are as follows : "Its principal laurels the subcutaneous administration of pilocarpium will reap in the desquamative nephritis of scarlatina, in the parenchymatous nephritis of diphtheria, and in acute and chronic nephritis generally. There is no doubt that a complete diaphoretic effect is, with rare exceptions, obtained with more regularity and rapidity by this than by any other diaphoretic, even the hot pack."*

II. REPORT BY THE COMMITTEE ON NEUROTICS, Dr. E. C. Seguin, Chairman, *on the Use of Chloride of Potassium in Epilepsy* ; also, *Preliminary Report on the Use of a Mixture of Chloral and Bromide in Epilepsy*. The first of these effectually disposed of the hypothesis of Prof. Binz that it was the potassium of the KBr. and not the bromine that was the efficient agent against epilepsy, and that the chloride of potassium would be quite as efficacious as the bromide. The report was based upon a large number of observations made by Dr. Seguin at the Epileptic and Paralytic Hospital on Blackwell's Island.

First of all, to determine the positive efficacy of the bromide,

* For full Report see *New York Medical Journal*, for February, 1878.

fourteen patients were selected to whom an inert placebo was given for one or two months. The number of attacks which occurred during this period was compared with the number which took place during a like period while the potassium bromide was administered. The ratio was as 319 to 94. A comparison was then made between the attacks occurring in thirty-four patients for one month under the chloride with the number under bromide during a like period, with the result of 873 to 377.

These figures show conclusively that the potassium is not the active agent in the bromide, and that chloride of potassium is not efficacious in the treatment of epilepsy.

Preliminary report on the use of a mixture of Cloral and Bromides in Epilepsy. Twenty-eight cases were observed. The proportions of the chloral to the bromide was generally one-half. The results seemed to show that the epileptic attacks were warded off quite as well by the mixture as by the bromides alone in equal doses, and that the bad effects of the bromides were materially lessened.*

THE COMMITTEE ON RESTORATIVES, Dr. A. Flint, Chairman, presented a preliminary report compiled by Dr. A. H. Smith, upon the *Use of Ether with Cod-liver Oil*, and also one upon the *Use of Defibrinated Blood for Rectal Alimentation*.

The former of these topics was suggested by a paper read by Dr. Balthazar Foster before the British Med. Association in 1868, on the use of etherized cod-liver oil in phthisis, in which paper he refers to the discovery of Bernard that ether increases the secretion of the pancreas, and proposes its use with cod-liver oil to obviate the defective action of the pancreas usual in phthisis.

The report covers thirty-one cases in which ether was given in connection with cod-liver oil. In twenty-six of these cases the combination was well borne. Of these twenty-six cases it is noted in twenty-four that either pure oil or an emulsion of oil had been tried, and had disagreed.

The ether was given *with* the oil in twenty-two cases; *after* the oil—fifteen to thirty minutes—in nine cases. Of these nine cases, in three the patients had tried, unsuccessfully, to take the oil *with* the ether, but exhibited perfect tolerance when the ether was given *after* the oil. About half a drachm of the spt. ether. sulph. was usually given at a dose.

The second topic reported upon, "*the Use of Defibrinated Blood for Rectal Alimentation*" had been so short a time before the Committee that the material for a report was limited to two

* For full report see *N. Y. Medical Journal* for April, 1878.

experiments and six cases. There were afterwards reported to the Committee nearly fifty additional cases, which will soon be made the basis of a report to the Society. From the aggregate of these observations, it appears that the treatment may often be extremely useful, not only in the class of cases in which chiefly rectal alimentation has heretofore been employed, viz., those in which alimentation by the stomach is nearly or quite suspended, but in a much wider range of cases, embracing all in which there is deficient nutrition from any cause which does not involve the rectum itself. Some of the results attained have been very remarkable.

From 4 to 8 oz. may be administered at bedtime, and, if desirable, a like quantity after the morning evacuation. In most cases it is retained without difficulty, and it is frequently so completely absorbed that the passages are not even stained with blood.*

A second report by the Committee on Neurotics, also preliminary, was on the subject of *the use of Duquesnel's aconitia internally in trigeminal neuralgia*. Ten cases were observed, from which the following conclusions were drawn :

1. The susceptibility of individuals to Duquesnel's aconitia varies enormously, one patient having been severely affected by $\frac{1}{200}$ of a grain, while another tolerated without any special symptoms $\frac{1}{8}$ every three hours. On an average, distinct physiological and therapeutical effects were obtained from $\frac{1}{100}$ of a grain three times a day.

2. Out of six cases of severe trigeminal neuralgia, one, probably reflex from a decayed tooth, was not at all benefited. Three cases epileptiform in form, were slightly or only temporarily relieved. Two cases were cured. One of these had existed for seven years, with an interruption of twenty months, procured by resection of the nerve. It would thus appear that in Duquesnel's aconitia, we must recognize one of the most powerful and best agents for relieving and curing trigeminal neuralgia.

3. We do not as yet know the forms of trigeminal neuralgia most influenced by aconitia. †

Besides the work here outlined, much has been done in committees which will eventually be embodied in reports to the Society.

Brief reports of observations upon any of the topics mentioned above, or upon other points of interest in therapeutics are solicited from members of the profession throughout the country ; such

* For full report see *N. Y. Med. Journal* for July, 1878.

† For full report see *N. Y. Med. Journal* for December, 1878.

contributions will be referred by the Secretary to the proper committees, and if use is made of them in reports due credit will be given to the authors, and a copy of the report sent to them. Address Dr. Andrew H. Smith, 110 East 38th Street, N. Y. City.

Total Extirpation of the Penis for Cancer. The *Bulletin de la Société de Chirurgie* for November, 1878 contains an account of an operation by Cabadé for the total removal of the penis, with a report thereon by M. Paul Berger. The account is of interest from an operative point of view, and also from the fact that two years have elapsed since the operation without a return of the disease. It is well known that in cancer of the penis isolated nodules of the disease often exist in the organ at some distance above the main tumor, and that recidive after partial amputation is as frequent here as it is under similar conditions in the tongue. When the return is not due to absolute nodules left in the stump, it is explained by the retention of part of the zone of proliferation which surrounds all cancerous growths. The principle contained in the rule to amputate entirely above a bone affected with cancer, is equally applicable to amputation of the penis, and its formulization as a rule of practice has probably been prevented only by operative difficulties, and the necessity of providing a permanent and free channel for the urine. The course usually followed is to amputate at a certain distance above the tumor, then at a higher point after the return of the disease, and finally, when the level of the symphysis has been reached, to abandon the patient to his fate. In many cases, undoubtedly, the removal has been made at a point well above the peno-scrotal angle, and has even included the crura of the corpora cavernosa, but M. Berger states that a careful search of all available statistics upon the subject failed to show any case previous to M. Cabadé's, in which the entire corpus spongiosum had been removed.

M. Cabadé passed a gum catheter into the bladder, encircled the root of the penis by two curved incisions meeting at the sides, the lower one passing through the peno-scrotal angle, and then dissected out the penis backwards through the two incisions, until he reached the membranous portion of the urethra. He then punctured the urethra at this point in the median line, passed the chain of an écraseur through the puncture, and successively divided with it the two halves of the urethra and the adjoining tissues, carefully keeping the chain close to the ascending ramus

of the ischium while making the constriction. The operation lasted forty minutes, and the loss of blood is said to have been insignificant, although a considerable number of arteries had to be tied. The lower lip of the incision was then drawn upward and fastened with a suture, and the catheter tied in.

The results were simple. The deep infundibulum left by the removal of the corpus spongiosum and bulb gradually grew shallow, the orifice of the urethra remained large, and micturition was easy. There was no sign of a return of the disease when the patient was last seen, more than a year and a half after the operation.

Notwithstanding the excellence of the result, the absence of complications, such as infiltration of urine during recovery, and the alleged facility of the operation, the Society was evidently of the opinion that, while the principle was to be accepted, the method should be modified. Anyone who has had occasion to remove the bladder and urethra from a cadaver, knows the difficulty of carrying the dissection under the symphysis, and every surgeon appreciates the embarrassment caused by even a moderate amount of blood where he is working at the bottom of a deep cavity, and there is every reason to think that in the great majority of cases the bleeding in the operation, as performed by M. Cabadé, would not be so "insignificant" as he found it. The rich plexus of veins lying between the symphysis and the neck of the bladder would of itself furnish blood enough to entirely obscure the field of operation, even if every little spiriting point in the irregular and shifting walls of the cavity could be promptly and effectually secured. The absence of infiltration of urine into the scrotum must also be regarded as an exceptional piece of good fortune, even when a catheter is tied in, and the latter is a practice always to be deprecated, and never to be employed except under the spur of an absolute necessity.

The modification proposed by Berger, with the view of meeting these objections, was to combine the two incisions with complete division of the scrotum in the median line, and union of its divided edges in such manner as to enclose each testicle in a separate pouch, then to prolong this vertical incision in the median line of the perineum and seek the bulb at its bottom. In the large superficial wound thus formed, the operator can readily control hemorrhage and pursue his dissection unembarrassed by blood or obscurity, the danger of infiltration of urine into the scrotum is entirely removed, and the divided end of the urethra is nearer

the surface, and therefore more easily treated in case it should become cicatricially contracted. [L. A. S.]

Obliteration of Varicose Veins. M. Davat describes again in the *Bulletins de la Société de Chirurgie* (meeting of 11th September, 1878), the method employed by him for obtaining the permanent occlusion of varicose veins, and supports it with the record of seventy-three cases thus treated with one death. He ascribes the death in the fatal case to unnecessary and accidental puncture of the vein. The method is as follows: the point of a pin or needle is entered vertically through the skin close to the side of the vein, carried beneath it, and brought out through the skin on the opposite side of the vein at a point corresponding to that at which it entered. The pin is then raised so as to allow a second pin to be passed at right angles to and beneath the centre of the first, perforating the wall of the vein at four points. The operation is completed by placing a figure-of-8 suture rather tightly about the projecting ends of the pins. The pins should be removed after the fourth and before the seventh day. M. Davat prefers steel needles one inch long, one millimetre thick, flattened and slightly curved at the point.

The reporter has employed this method in one case with a good result, obtaining complete obliteration of the internal saphena vein in five days, without suppuration or the loss of a drop of blood, and with no more inconvenience to the patient than the slight pain of the puncture and the necessity of remaining in bed for a week. [L. A. S.]

A hitherto undescribed form of Vaginal Disease—Colpitis Gummosa. F. WINCKEL.

The patient, a brunette, æt. 28, had had various diseases during early life, and leucorrhœa since her seventeenth year. When nineteen she had an eruption, and soon afterwards an inflammation of the left eye. She had also an inflammation of the bowels, after which there was a temporary loss of hair. The first coitus occurred in 1870, a few months after the eruption. She denied any ulcer on the genitals, nor were there any well-marked symptoms of syphilis. In October, 1878, the following was her condition: The left eye was closed, the lids greatly reddened and swollen, and the lower lid turned in so that the lashes rubbed on the cornea. The inner surface of the lid was covered by a milk-white membrane, which was only loosely attached. The inner and lower parts of the conjunctiva of the eye-ball were much swollen

and covered by a similar membrane. The remainder of the conjunctiva was red, and filled with dilated vessels. Towards the point of the conjunctiva which was most deeply affected, the cornea was infiltrated and gray. The pupil was dilated and irregular. There was a small ulcer on the right tonsil. The vulva as far as the mons was slightly reddened. As soon as the nymphæ were pulled apart there could be seen a grayish white coating, which was either closely adherent, or separated in certain spots in the form of a membrane. This covering extended from above the urethra down over the nymphæ as far as the posterior commissure, and also penetrated and covered the whole of the vagina. The uterus was free, except that a small spot was once observed on the posterior lip. The os was smooth, free from membrane, and showed no trace of any cervical discharge. The uterus seemed normal in position and size, and there were no traces of membrane within its cavity.

The vaginal covering was in parts several millimetres thick, and could be easily torn off by forceps. The portion of mucous membrane thus exposed was of a pale red. Great difficulty was experienced in introducing either the speculum or finger. The feel to the latter was as though the vagina had been acted upon by a strong solution of alum or iron. There was no discharge of any kind. The reaction of the membrane was intensely acid. The case seemed like a immense croup of the vagina. The temperature was at no time elevated, either in the rectum or vagina. The microscopical examination of the pieces when removed showed numerous fatty cell-like bodies, which in some instances held acicular crystals. These bodies were dissolved by ether. Further there were thick layers of flat epidermic-like cells, which had in part undergone horny degeneration. A portion of the mucous membrane, well covered with the white membrane, was cut out from just behind the carunculæ and submitted to Dr. Birch-Hirschfeld for examination, and elicited the following report: The epithelium was decidedly thickened, and the epidermis-like upper layers were abundantly separated in connection with the layers of the membrane. The epithelial layer, which corresponded to the rete malpighii, showed very large cells, and was much thickened. The papillæ were hypertrophied, and the submucosa enormously thickened, containing very numerous vessels with thick walls. Between the vessels there was a rich infiltration of round and spindle cells. The tissue greatly resembled the microscopic picture of a fresh gummy tumor.

The membrane when removed renewed itself in two or three days, by the appearance of minute rounded points which ultimately coalesced.

Another interesting point in the case was, that after two days of a very slight bloody flow from the vagina, on introducing the speculum, the vagina was found filled with a clayey black mass, which resembled the blood-clots formed by liq. ferri perchloride, only much dryer. For nearly a month such masses were daily expelled from the vagina. The membrane on the eye and that on the vagina resembled each other in every respect.

Dr. Winckle reports himself as unable to find any such case recorded. He found a somewhat similar case in the *Pathological Anatomy* of B. Hirschfeld, the case of a woman fifty-four years of age, who had abundant evidences of syphilis, and in whom the vagina was narrow, smooth and white. The submucosa and perivaginal connective tissues were indurated by a gummy infiltration, so that the vagina looked like a stiff tube with very thick walls. The resemblance to this case was only partial.

Two causes for the peculiar condition presented themselves—the action of strong medicinal agents and syphilis. The first was very unlikely, as the case was a long time under observation. The second was more probable, although the evidences of infection and well-marked traces of the disease were wanting, and the history was against it. Moreover, the disease resisted energetic anti-syphilitic treatment. The name is derived from the resemblance of the microscopic appearance to that of a gummy tumor. —*Centralblatt für Gynäkologie*, 1878, No. 24. [M. D. M.]

A New Method of Sterilization. J. Kocks, Privatdocent in Bonn.

The author starts out with the proposition that there are many cases where affections of the lungs, heart or kidneys, narrow pelvis, etc., render pregnancy and labor fraught with danger, and make a method of preventing the possibility of pregnancy very desirable. This he seeks to do by an operation which he calls “sterilization.” By this operation he expects to make the woman permanently and completely sterile. This he thinks is better than oft-repeated premature artificial abortions, or the numerous common methods of preventing conception, with the attendant baneful results on the nervous systems of both parties.

The operation consists in *obliterating the uterine orifices of the fallopian tubes*, so as to prevent the ovum from descending, or the spermatozoa from ascending to meet it. This obliteration he pro-

poses to accomplish by cauterizing the parts with the galvano-cautery, using an electrode specially constructed for the purpose. The burning point of the platinum is about one centm. long, and the curve such as to enable the operator to easily carry the instrument to the neighborhood of the orifice of the tubes. The author does not consider it necessary that the orifice itself should be actually touched, but thinks if the instrument is brought into its immediate neighborhood, that the cautery effects will extend so far, that when cicatrization takes place the tube will be closed. By using the galvano-cautery the instrument can be introduced cold and heated when in position, so that its effects can be limited. He has operated on one case, the patient having some disease of the lungs. She was within eight days of her menstruation. No anæsthetic was used. The point being in place the current was turned on, and kept on for forty-five seconds on the left side and one minute on the right. No bad symptoms followed, and the patient made a good recovery.

The author adds: "I do not deny that there is a lack of certainty that the operation will accomplish its end. Proof can only be obtained from an autopsy, since, even if sterility follow, it may be due to other causes."—*Centralblatt für Gynäkologie*, 1878. No. 26. [M. D. M.]

Hyperpyrexia and Apyrexia produced by injuries of the Cervical Spinal Cord. DR. A. NIEDEN.

While serving in the German Hospital of London, the author observed the three following instructive cases. Case I, dislocation (spontaneously reduced) of the last cervical and first dorsal vertebræ in a male, aged sixty years; spinal cord found absolutely disorganized at post mortem; complete paralysis and anæsthesia below the third rib; intercostals inactive. The axillary temperature was frequently observed as follows: Ten hours after the accident, T. 35.1°C., (95.18°F.), P. 52, R. 18. Until the beginning of the third day the mercury gradually rose to 37°C., (98.6°F.), and on the fourth day it gradually fell to 35.4°C., (95.7°F.); on the sixth day 35°C., (95°F.), in the ensuing night it suddenly sank to 32.3°C., (90°F.); on evening of seventh day T. 31.1°C., (88°F.), P. 42, R. 14; on the morning of the eighth day 30.1°C., (86.2°F.); on ninth day 29.1°C., (85.4°F.). Patient in good general condition. On the eleventh day, after a good night's rest, T. 27.2°C., (80.9°F.). Later in the day cyanosis; T. 27°C., (80.5°F.); death. Four hours post mortem, the thermometer left in the axilla for fifteen minutes, registered 27.3°C., (81.1°F.).

The temperature of the mouth and rectum was often taken, as checks on the axillary measurements, and differences of less than $0.6^{\circ}\text{C}.$, ($1^{\circ}\text{F}.$) were found. It may be well to state that the lowest temperature observed by Wunderlich in cholera was $32^{\circ}\text{C}.$, ($89.6^{\circ}\text{F}.$). Case II, male, aged twenty-three years; fracture and dislocation of the sixth and seventh cervical vertebræ, complete paralysis and anæsthesia from third intercostal space downward; axillary temperature gradually rose from $38.8^{\circ}\text{C}.$, ($101.8^{\circ}\text{F}.$) to $43.4^{\circ}\text{C}.$, ($110.12^{\circ}\text{F}.$), at the time of death on the second day, the pulse ranged up to 160 per minute. A few hours after death the mercury rose a few tenths of a degree. Case III, dislocation and fracture of the fourth cervical vertebræ, crushing of the cord; complete palsy and anæsthesia of all four extremities and of trunk below second intercostal space; vital signs very soon after the accident; axillary temp. $33.4^{\circ}\text{C}.$, ($92.1^{\circ}\text{F}.$), P. 48, R. 18. In the course of four hours, the record showed T. $32^{\circ}\text{C}.$, ($89.6^{\circ}\text{F}.$), P. 40, R. 14; in ten hours, T. $35.6^{\circ}\text{C}.$, ($97^{\circ}\text{F}.$); in thirteen hours, T. $37.3^{\circ}\text{C}.$, ($99.14^{\circ}\text{F}.$), P. 76, R. 24. The temperature steadily rose, delirium set in, and death took place from paralysis of the heart in nineteen hours and a-half, with T. $39.2^{\circ}\text{C}.$ ($102.5^{\circ}\text{F}.$).—*Berliner Klinische Wochenschrift*, 1878, No. 50.

[E. C. S.]

ORIGINAL OBSERVATIONS.

A CASE OF APHASIA WITH RECOVERY OF THE POWER OF SPEECH AFTER ITS ENTIRE LOSS FOR SEVERAL YEARS.

By WILLIAM A. HAMMOND, M.D.

In the spring of 1871 I was consulted in the case of Mr. W. M. B. of Boston, who was affected with right hemiplegia and complete aphasia. The clinical history as well as the existing symptoms indicated embolism of the left middle cerebral artery as the pathological condition. I gave an unfavorable prognosis as regarded the recovery of the power of speech, but expressed the opinion that there might be some improvement in the ability to move the arm and leg that were paralysed. The former he could not at the time use at all, over the latter he retained slight power of motion.

In regard to language, there was, as I have said, complete abolition, not only of articulate speech, but even of the ability to write or make other signs for words. The aphasia was both amnesic and ataxic.

I heard nothing more from this patient till I recently received a letter from a gentleman under whose immediate charge he is, from which I make the following extracts: 'Within the six months last past, he has made great progress in the way of learning to talk, being able to say 'yes' or 'no,' when asked a question, and replies 'strong,' 'nervous,' 'tired,' and a dozen other words as the case may require when asked how he feels. If he wants a window shut, he says 'cold window,' if to be opened, he says 'hot window.'

"I write this to inquire in his behalf what chance there is of his entirely recovering his speech, and if the improvement now going

on has any connection with a chance for improvement in the use of his leg or arm, as neither of them is better or worse than when you saw him. If you could give him any encouragement from your knowledge of similar cases, it would inspire him with new life. I would say here, that until within six months he has been unable to use beyond three or four words, but now he employs I should judge, as many as five or six hundred. Can repeat the days of the week, and count up to twenty."

REMARKS.—I think this will be generally regarded as a very remarkable case. The fact that there has been no improvement in the right paralysis, would appear to show that there has been no restoration of the tissue or functions of the damaged portion of the left side of the brain. Is there not therefore, strong ground for supposing that the right hemisphere has been educated up to the point of acquiring the power to initiate articulate speech, or has suddenly gained this faculty? Certainly, the speech tract on the left side was most severely injured, and it is difficult to imagine that its integrity could be restored without some improvement of the motor power so intimately connected with it.

DERMATITIS PRODUCED BY THREE PREPARATIONS OF
OPIUM IN THE SAME SUBJECT.

By E. C SEGUIN, M.D.

The following case illustrating the unexpected results which may follow the moderate use of well-known remedies, was of great interest to the Committee on Neurotics of the N. Y. Therapeutical Society, and is perhaps worthy of record. The patient was a lady about fifty years of age, of nervous temperament, and of generally good health. When I first saw her on September 24th, 1878, she had been suffering for several months from mild melancholia; her chief symptoms being sadness, delusions as to her wickedness, hopelessness of recovery through human agency, and insomnia. On my proposing the opium treatment which is my main reliance in such cases, I was told that some time ago a very small dose of morphine had produced an erysipelatous eruption. Unwilling to give up my mainstay in treatment, I preferred to run the risk and prescribed a pill composed of extract of opium, one-eighth grain, extract of cannabis indica, one-fourth grain, and quinine, two grains, to be taken three times a day. The next morning, after

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having taken three pills, Miss L. called and showed me upon her neck an erythematous patch almost encircling it, and which was the seat of extreme burning and itching. She stated that several such patches were on other parts of the body. The patches appeared red and felt hot ; they presented neither papules or vesicles. This eruption exactly resembled, the patient said, the "erysipelas," which had on several occasions been caused by morphine and opium. It should be added that although the patient had no knowledge of my prescription, she positively expressed the belief that I had given her opium. On the third day the symptoms were aggravated. In addition to erythema of the neck, there was a distinctly erysipelatous condition of one upper eyelid; characterized by redness, œdema and tenderness. The opium was now (Sept. 26th,) discontinued, and in a few days the skin resumed its usual healthy appearance.

The patient steadily improved in her mental condition, under the use of dilute nitro-muriatic acid and strychnia before meals, and of camphor and cannabis pills at bed-time.

On November 11th, I ordered in place of the above pills, others composed of cannabis, gr. j ; camphor, gr. ij ; codeia, gr. ss. ; aloes, gr. ss. ; one to be taken at night. On the very next morning, (Nov. 12th,) the unfortunate lady exhibited erythema on neck, shoulders and body, the left eyelid was red and a little swollen. She was told to resume pills without codeia, and very soon all trace of the cutaneous affection disappeared.

MYELITIS OF THE ANTERIOR HORNS OF TRAUMATIC ORIGIN.

BY E. C. SEGUIN, M.D.

F. M., a carpenter, twenty-seven years of age, presented himself at my clinic for Diseases of the Nervous System, on September 20th, 1878, and gave the following history. On the sixth of April last, he fell from the fifth story of a building, and dropped obliquely upon the sidewalk and curbstone, striking his hip and side. He did not lose consciousness, and there was no marked external injury. He immediately experienced partial paralysis of both lower extremities, and of the left upper extremity. In four weeks recovered the use of his arm. In six weeks later he began to improve in his lower limbs, and by July 20th, could walk without crutches. At no time was there any loss of sensation, though

there was a degree of numbness and tingling of the paralyzed parts. Had no pains, cramps, or jerking of these parts, but he well describes epileptoid trepidation. Urine was retained (catheter used for three weeks after accident, rectum unaffected; never incontinence of urine. Since July has regained his normal state except a peculiar disability in his legs, and burning in the toes of both feet, which perspire freely.

Examination: Patient free from symptoms above knees; below knees has atrophic paralysis of the anterior tibial group of muscles on both sides. In walking, the feet are brought to the ground in a slapping or flapping manner. Posterior tibial and peronei muscles normal. No tendon-reflex at knees, but foot-phenomenon can be slightly produced on both sides. Sensibility normal. Electrical reactions; no faradic or galvanic reaction in anterior tibial nerve; no faradic reaction in anterior tibial muscles; galvanism produces slow contractions in the paralyzed muscles with the formula $KaCC=An\ CC$. Up to present time (January 10th, 1879), M. has been treated with galvanism to the legs, ergot and iodide of potassium. Although several accidental causes have interrupted the treatment, marked improvement has taken place. Some voluntary power has returned in all the muscles of the left anterior tibial group, and in the tibialis anticus of the right side.

It would seem as if a sudden hyperæmia of the cord had been produced by the fall, with hemorrhage or myelitis in the lumbar region limited to a small part of the anterior horns, seriously injuring those ganglion cells which give origin to the nerve fibres innervating the anterior tibial regions. One case of traumatic infantile paralysis (lesion of the anterior horns), by Dr. Allbutt, (*Lancet*, 1870, II, p. 84), and another in the adult by Prof. Leyden, (*Archiv für Psychiatrie und Nervenkrankheiten*, vi. p. 271), have been placed on record. A number of cases of traumatic spinal paralysis in the course of which muscular atrophy appeared, are also recorded by Ollivier, Gull, and Erichsen.

As the Metric System will be used in this Journal, the following Tables, for reference, are given for those not yet familiar with the system :

METRIC MEASURES OF LENGTH.

1 Millimetre	0.001=	.039 inches
1 Centimetre	0.01 =	.393 "
1 Decimetre	0.1 =	3.937 "
1 METRE	1. =	39.370 "
1 Kilometre	1000. =	.62 miles

APPROXIMATE EQUIVALENTS.

1 ℥ or 1 gr.	=	.06 grams
1 f 3 or 1 3'	=	4. "
1 f 3̄	=	30. "
1 3̄	=	31. "
1 f 3̄ Glycerine . . .	=	37. "
1 f 3̄ Syrups	=	40. "

METRIC WEIGHTS.

1 Milligram	0.001=	$\frac{1}{64}$ gr.
1 Centigram	0.01 =	$\frac{1}{6}$ "
1 Decigram	0.1 =	1 $\frac{1}{2}$ "
1 GRAM	1. =	15.432
1 Kilogram	1000. =	2.7 lb.

TEMPERATURE.

37° Cent.	98° 6 Fahr.
38° "	100° 4 "
39° "	102° 2 "
40° "	104° "
41° "	105° 8 "
1° C.=1°.8 F.	Multiply C. by 1.8,
	add 32=F.

ARCHIVES OF MEDICINE.

Original Articles.

SUPPLEMENTARY RECTAL ALIMENTATION, AND
ESPECIALLY BY DEFIBRINATED BLOOD, AS APPLI-
CABLE TO A LARGE RANGE OF CASES IN WHICH
NUTRITIVE ENEMATA HAVE NOT HERETOFORE
BEEN EMPLOYED.*

BY ANDREW H. SMITH, M.D.

PHYSICIAN TO ST. LUKE'S HOSPITAL.

IN contrasting the practice of medicine of to-day with that which prevailed fifty, forty, or even thirty years ago, the salient difference which is at once apparent, is in the prominence which is now given to the "supporting," instead of the former reducing treatment. Indeed, the period I have named has witnessed a complete revolution in the opinions and practice of the profession on this point. Forty years ago, inflammatory and febrile affections were very generally supposed to require antiphlogistic treatment, the lancet, calomel and antimony, and to these were added the lowering effect of the antiphlogistic regimen of which water gruel formed a prominent factor. At the present time, the term antiphlogistic treatment is obsolete, and with it the antiphlogistic regimen has become a thing of the past.

This is the result of a conviction, which, after the lapse of centuries of observation and study, has somewhat suddenly

* Read before the N. Y. Academy of Medicine, February 20th, 1879.

dawned upon the profession, that disease is a burden imposed upon the economy, which can be sustained and ultimately thrown off only by an expenditure of vital energy; and that in increasing, and not in diminishing vital force, are we furthering the reparative processes of nature.

At the present day, with the exception of diseases located in the digestive organs themselves, and which require rest of these organs from functual activity, there is scarcely any affection in which it is considered necessary to withhold the amount of nourishment which the stomach craves, while in very many cases benefit is thought to follow the administration of a much larger quantity than the patient desires. Even in surgical cases, occurring suddenly in persons previously in perfect health, the value of generous alimentation is recognized, and was ably advocated by Prof. Hamilton in a paper read before this body two years ago.

If then we considered the principle established, that the chances for recovery in the vast majority of cases, are promoted by keeping the nutrition as nearly as possible up to the normal standard, the question arises: How can this object best be obtained? There can be no hesitation in saying that the most natural means are the best, so long as they are adequate. If the stomach will take and digest sufficient food, and if the absorption and assimilation go on regularly and properly, there is no need for anything more, and there can be nothing better.

But there may be an obstacle to the introduction of food into the stomach, or to its passage beyond the pylorus; or there may be inflammation or ulceration of the stomach, causing ejection of the food; or from some reflex irritation vomiting without actual gastric disease, may occur to an extent to imperil life. For this class of cases, in which the function of the stomach is practically suspended, rectal alimentation is clearly indicated. I need only refer you to the

able and exhaustive paper read by Prof. Flint before the Academy in December, '77, for a complete discussion of this most interesting topic, as limited to this class of cases.

But it is the object of this paper to inquire whether nutritive enemata may not be useful in a great many other conditions, not as a substitute for, but as an aid to, stomach alimentation; and to answer this question as well as I can, by laying before you the experience acquired in about eighty cases treated in this way by myself and some of my friends during the past year.

There are a variety of conditions of the system that have this in common, that the stomach, though not the seat of structural change, is what is termed in popular language, *weak*. There is little desire for food, and the food that is acceptable is not of a nourishing character. If a larger amount of food is forced down, or if something more solid is taken, the result is either vomiting or the flatulence, or diarrhœa, which depend upon the passage of undigested food into the intestinal canal. But often these effects are not observed, for the want of appetite removes from the patient all temptation to go beyond his digestive power, and he is satisfied to abstain from the food for which he has so little relish. Thus he lives in a state of semi-starvation, and the ill-nourished tissues from lack of vitality too often fall a prey to structural degeneration.

This condition when standing by itself is recognized as atonic dyspepsia; but it is the accompaniment or result of a wide range of affections by which it is overshadowed, and which sometimes cause its importance to be overlooked.

Now, if poverty of blood is not the original occasion of the weak stomach, it very speedily becomes its result. Indeed, these two conditions necessarily act reciprocally as cause and effect. And the reason of this is plain. Weakness of the stomach, (and by the word stomach in this connect-

ion, I mean the whole alimentary apparatus), depriving the system of a portion of its necessary supply of nutritive material, must result in impoverishment of the blood; while a stomach whose nerves, muscular fibres and glands, are supplied with thin and watery blood must be irritable, must perform its muscular movements languidly, and must afford a weak and inefficient secretion for the solution of food, in other words must become weak. Thus we have a circle established, atonic dyspepsia producing poverty of the blood, poverty of the blood producing atonic dyspepsia.

I have lately read in one of our journals of a case in which, without any obvious cause, the heart's action was found to be growing weak. From hour to hour the pulse became feebler, and the ear applied to the chest heard the heart-beats fainter and fainter. There was no evidence of any internal hemorrhage; there was no brain lesion to paralyse the heart, no cardiac poison had been taken. The entire symptomology was summed up in the one expression, failure of the heart. All the stimulants given produced no effect, and the doctors could only stand by with finger on the pulse and note that life was fast going out. Why, they could not tell. The autopsy solved the riddle. In one of the coronary arteries was lodged an embolus, and the heart, upon which the whole frame depended for blood, was itself left bloodless.

How often is the stomach in like case? The whole system looks to it for nourishment; yet it is itself often nourished with such a beggarly quality of blood that, like the heart in the case I have cited, it has no longer strength to carry on its work.

This condition may, as I have remarked, stand by itself, but it is much more frequently the result of some other disorder, past or present. In these cases the blood may first be affected, and through it the stomach, or the stomach may suffer first, and through it the blood.

The blood is first affected in hemorrhages, protracted supuration, in scrofula, phthisis, renal disease, etc., while the first attack is upon the stomach in diseases which are located in the organ itself, or which affect the nerves supplying it, or cause irritation in other organs which stand in intimate reflex relations to it, such as the uterus, the liver, and the brain.

The treatment of this condition as a complication is, of course, involved in that of the disease with which it is associated. But inasmuch as these diseases, when not actually incurable, are much more manageable if the nutrition can be maintained, it often becomes necessary to regard the defective action of the stomach as the principal feature in the case. In these cases, as well as when the condition is primary, the treatment has heretofore been narrowed down to three lines of procedure. We have endeavored to furnish to the debilitated stomach an aliment which would require the least possible digestion; or we have attempted to supply artificially the necessary digestive fluids; or we have tried by means of tonics, stimulants, hæmatics, etc., so to work upon the nervous and vascular supply of the stomach as to force a more vigorous action. The first of these attempts has resulted in the multitude of patent foods with which the market is flooded, in the use of cod-liver oil, in the consumption of alcohol as a food, and last, but not least, in that most pitiful of all delusions, beef-extract.

To the second we owe pepsin in its myriad forms, pancreatin, and lastly ingluvin, prepared from the gizzard of the domestic fowl, and five times as strong as pepsin; and we may prophesy with confidence that ere long we shall find upon our tables illuminated circulars, in the highest style of decorative art, announcing a new preparation, fifty times as strong as ingluvin, made from the gizzard of the ostrich. In the third, we employ, in short, the whole *materia medica*.

And there can be no doubt that by a judicious use of these agencies, together with suitable hygienic measures, a vast amount of good can be, and is, accomplished. Still we must all confess that there is yet much to be desired, and that any plan which promises to help us out of even a part of the difficulties which we meet in treating these constantly recurring cases, will be a welcome addition to our resources. For the condition of insufficient nutrition forms an important factor in almost all chronic diseases, and in many that are acute. Nay, it is the broad avenue by which death enters in those cases which terminate by exhaustion, and it aids also indirectly in the other modes of dissolution.

Such an addition to our resources as I have referred to is afforded, as I believe, by what I propose to call *Supplementary Rectal Alimentation*, that is to say, the use of rectal injections to supplement alimentation by the stomach.

The power of the rectum to absorb aliment has been so often demonstrated, and the demonstration has been so fully set forth before this body in the paper to which I have already referred, that time would be wasted in further argument to prove it. It remains only to consider whether the fact of such absorption can be turned to account in the class of cases now under discussion.

But here we are met at once by the question: If the stomach is in a great degree incapacitated for absorbing by the influence of some general condition of the system, will not that incapacity necessarily extend to the rectum also? To this I answer, without hesitation, No. The fallacy that lies in this question is in assuming that the conditions for simple absorption in the stomach and in the rectum are alike, while, in fact, they are as different as possible. The stomach is an exceedingly complex organ, not designed merely to afford a surface for absorption, nor yet simply to reduce solid aliment to a fluid form, but which has for a part

of its function to create, in many cases, new substances from the food presented to it. Thus, for example, albuminose is not a mere solution of the several nitrogenous principles of the food by the gastric juice, but a distinct principle in itself, the result of a recomposition of elements. It is only after the reactions have taken place, of which the above is an example, that stomach absorption begins, and if digestion in this sense is interrupted, absorption is also suspended. Moreover, the stomach is the centre to which reflex influences tend from many other organs and parts of the body, and as such is liable to derangement in sympathy with them. But with the rectum all this is different. It is scarcely more than a passive pouch, whose mucous surface absorbs fluids much as the serous surface and the subcutaneous connective tissues do. It suffers but little reflex disturbance from excitement elsewhere, and is comparatively insensitive to irritation within itself.

Theoretically, then, we might anticipate what has been practically demonstrated, that the rectum will continue to absorb aliment long after the stomach has refused to perform its office.

But then another question arises: Does the absorption of a certain amount of aliment by the rectum do anything more than to add so much nutritive material to the blood? Does it help at all toward restoring a natural condition of nutrition, and shall we not in any given case of a chronic character, stand just as much in need of such aid next week or next year as we do to-day? The answer is: In some cases, yes; in many cases, no. If the innutrition depends upon a cause which cannot be removed, a cause which might exist in a well-nourished body, doubtless the need for aid to the stomach will continue. But if the condition be one simply of weak stomach, and the stomach is weak only because its muscle and glands and nerves are supplied with an

impoverished blood, then every particle of aliment taken up from the rectum is absolutely curative. It helps to improve the condition of the blood, and its influence will be felt sooner in the stomach than anywhere else. The result will be improved appetite and better digestion, and the stomach will be brought nearer to the condition in which it can provide for its own necessities and for those of the system at large.

The result of a considerable number of cases in which transfusion of blood has been resorted to, to correct a condition of extreme innutrition, shows that a little extraneous aid is often all that is required to reverse the tendency of the system and to give it an upward instead of a downward direction. How little is the strength of the engineer compared to the power of the mighty engine under his charge; yet that little strength exerted to carry the balance-wheel beyond the "centre" may prevent a stoppage of the whole machinery.

At the same time the direct support to the system to be attained through nutritive enemata independently of any improvement of stomach digestion, is not to be despised as a temporary resource in acute cases. There are many times when the stomach suddenly gives out, or when its fullest powers are not equal to the unusual demand upon them, and in such cases nourishing injections may render invaluable aid.

If, then, the value of this method of alimentation be conceded, the question arises: What is the best material to be employed? Milk, raw eggs, animal broths, etc., are usually employed. Since the publication of Prof. Leube's paper on rectal alimentation in 1872, the preparation which he recommended has come largely into use, and to this Dr. Flint gives the preference. It consists of the muscle of beef, partly digested by an artificial process, and brought to a

sufficiently fluid condition to be administered by means of a syringe. Life has been sustained for periods of two or three weeks or longer with this preparation alone, and there can be no doubt that a considerable proportion of it is absorbed. Yet it is only imperfectly dissolved and semi-liquid flesh, containing a great deal of innutritious fibre, and, as such, appears to me to be greatly inferior to the perfectly fluid and wholly absorbable flesh which nature has prepared in the form of blood. It was while listening to Dr. Flint's paper that it occurred to me that in no other substance could we be so certain of finding all the elements of blood as in blood itself, and that it would be better to make use of it before it had become solidified into the form of flesh than to take the flesh and try to reduce it again to a liquid state. A few experiments convinced me that the blood was very readily absorbed by the rectum, the corpuscles being taken up as well as the serum. In experiments of this kind, blood presents the advantage of distinguishing itself by its color from the fecal matters in the dejections, and it is thus easy to form an idea of the amount voided. I soon found that in many persons an enema of 90 to 120 grams (3-4 ounces) of blood administered at night would be so completely absorbed in the course of eight or ten hours that no trace of it could be found in the morning evacuation, while larger quantities, such as 180, 240, or even in a few cases, 300 grams were retained, and the evacuation showed simply a small quantity of a dark red material of a tarry consistence mingled with the feces.

In order to retain the blood in a fluid state, it is necessary to have it defibrinated at the moment it is drawn. The proportion of solid matter lost in this way is not great, and if, as Virchow asserts, the fibrin of the blood is an excrementitious product, only waiting to be removed, the loss is in reality a gain.

The process of defibrinating is understood at all the slaughter-houses, where the blood so prepared is known as "stirred blood."

Seeing how readily the corpuscles as well as the serous elements of blood are taken up from the rectum, it appears to me self-evident that the material thus added to the circulation, either directly by capillary absorption, or indirectly by way of the lacteals, the receptaculum chyli and the thoracic duct must be more nearly homologous with the blood than would be the case if any other alimentary substance were employed. Nay, we may go further, and state that it is more nearly homologous than some of the products of stomach digestion. Chyle, for example, as we all know, is a white, milky fluid, widely different in its sensible qualities from blood, and very different in its chemical constitution. To convert it into living, active blood requires a process of elaboration, the steps of which have never been traced. How or where the transformation takes place we do not know. But it requires no argument to prove that a slight change must be more readily effected than a greater one, and that blood which has merely had its corpuscles dissolved presents the elements for the formation of living blood in a more readily available shape than a fluid so dissimilar as chyle, and *a fortiori*, as milk, eggs, or a solution of meat.

And here we are brought to the border of an unknown, unexplored territory. Libraries have been written on imperfect solution and absorption of nutritive material, but what do we know about imperfect conversion of what is absorbed into blood? Under what conditions may it arise, what relation may it have with fever, and to what extent may it not complicate the diseases which we are called upon every day to treat? As yet we can only conjecture, but into the void which exists in our knowledge, we may at least project this thought that the nearer the substances ab-

sorbed approach to the character of blood, the less chance there will be of imperfect conversion into the blood. And I fully believe that blood absorbed from the rectum nourishes the system more directly and more efficiently than if the same blood were swallowed and digested in the stomach; for, in the first case, it enters the circulation but little different from the blood with which it mingles, while in the second case it becomes chyme—the same as any other chyme, and subject to the same conditions of absorption.

In urgent cases, and especially when the stomach cannot be called upon to perform its office, defibrinated blood may be injected into the rectum in quantities of from 30 to 90 grams every two or three hours. For chronic cases, in which it is designed merely to aid stomach nutrition, from 90 to 180 grams may be given once or twice a day. Given at bedtime it usually causes no discomfort during the night, and there is only the customary evacuation after breakfast the next morning. If thought desirable, another injection may then be given, the recumbent position being maintained for a few minutes, after which, as a rule, there is no consciousness of anything unusual in the bowel, and the patient may go about his daily occupation. Any ordinary syringe may be employed, care being taken to cleanse it thoroughly each time without delay, lest the valves become adherent and fail to act. It is not necessary that the blood should be warmed in all cases. Many patients can bear it perfectly well without. But if the rectum is at all irritable, it is best to put the quantity of blood required into a small tin vessel, and set it into warm water until it has acquired about the temperature of the body. Warming the injection also promotes rapidity of absorption, and is therefore important when the supporting effect is required with as little delay as possible. As bearing upon this point the following experiments made last summer are of interest. I found that 8 grams of fl. Ext. of Rhubarb, in 20 grams of

water at a temperature of 22.8°C . (73°F .) gave in sixteen minutes, after being taken into the stomach the characteristic red color to the urine on the addition of caustic potash. Two trials of the same quantity at the same temperature injected into the rectum, gave sixty-five and seventy minutes respectively, as the time required to produce the same effect. When the temperature of the injection was raised to 42.2°C . (108°F .), the red color was obtained in forty minutes, while at a temperature of 36.6°C . (98°F .), forty-two minutes were required.

An important observation bearing upon the absorption of enemata, was made recently in my service at St. Luke's Hospital. A man with phthisis in the last stage, who was receiving every evening an injection of 120 grams of blood died suddenly at five A.M., eight or nine hours after the last enema had been given. The amount of the injection was not sufficient to half fill the rectum, yet at the autopsy Dr. Satterthwaite found that the large intestine was very evenly lined with a coating of thickened blood, for a distance of nearly three feet. Since then a case has come under my observation in which there is always a gurgling in the descending colon within a few minutes after the injection is received, indicating that the fluid is working its way upward. This is important as showing that even a small bulk of fluid thrown into the rectum spreads itself over a considerable absorbing surface. I am not aware that any other post-mortem observation of the character above mentioned has been made, indeed, with the substances usually employed for injections, it would be difficult to tell how far up they extended, since they could not be readily distinguished by their appearance from fecal matter.

The observation perhaps, explains a fact mentioned by the late Dr. Peaslee in the discussion upon Dr. Flint's paper, that he had often used the long tube in giving nutri-

tive enemata, but never found that any advantage resulted from carrying the injection into the colon. Of course, it would be superfluous to do so if the fluid finds its way there of itself within a short time after it is thrown into the rectum.

As might be expected, there are occasionally inconveniences attending this treatment, and which may be so serious as to compel its abandonment. In the first place the rectum may be so irritable that the injections will be immediately returned. This has happened only two or three times out of eighty cases, of which I have notes. Again, the injections may be retained for a while, but may produce severe colicky pains. Both these difficulties may sometimes be met successfully by giving the blood at first in very small quantities warmed, and with the addition of a little tincture of opium. The bowel usually becomes more tolerant by habit.

More or less constipation occurs in perhaps one-third of the cases. In a case related to me by Dr. Seguin, he was obliged to give up the treatment on account of a very fetid odor emanating from the person. This was also noticed in one of my cases but it continued only a few hours.

In another case in the practice of Dr. A. E. M. Purdy, the patient refused to go on with the treatment because, as she averred, she tasted the blood.

In two cases the discharges were so very offensive as to cause serious annoyance in the house. One of the patients was taking on his own responsibility 270 grams (9 ozs.) of blood every night. When the quantity was divided and half of it given in the morning, the difficulty nearly ceased.

In one case of ovarian neuralgia, not attended by anæmia, nervous irritability and insomnia were produced.

With these exceptions no cases have come to my knowledge in which the use of the blood has been attended by any ill effects.

The cases which I have treated, or of which I have notes

furnished by my friends, cover a pretty wide range of affections, in all of which asthenia was a prominent condition and presented the leading indication for treatment.

Naturally a considerable number of cases (about forty), were of pulmonary phthisis. This disease, perhaps more than any other, illustrates the reciprocal influence of an enfeebled stomach and impoverished blood. Whichever of these we regard as the cause, entails the other as its simultaneous effect. The tendency therefore, must inevitably be from bad to worse, unless in some way the stomach can be strengthened, so that it may afford an increased amount of pabulum to the blood, or the blood be enriched so that it may impart greater vigor to the stomach. The latter, we may hope to do in some measure by calling in the aid of the rectum, by which we may effect daily or more frequently, a modified transfusion of rich blood into the circulation.

But there is also, perhaps, no other disease in which it is so difficult to determine the effect of treatment. Under any plan the condition of the patient is liable to sudden changes. The occurrence of even a moderate hemorrhage will cause a considerable loss of weight which may be speedily regained under favorable conditions afterward. The same is true of intercurrent attacks of bronchitis, or of circumscribed pneumonia or pleurisy. An unfavorable change in the weather will aggravate the cough and wear down the strength and flesh, while an interval of warm dry weather will cause a general feeling of improvement and encouragement, and tip the scale again the other way.

Besides, nearly all hospital patients with phthisis improve during the first few weeks after admission, owing to the better hygienic and dietetic conditions by which they are surrounded. From all these considerations it is extremely unsafe to ascribe to a change of treatment, either the falling off or the improvemunt which may follow, unless the rela-

tion of cause and effect is evident. Still, if the inauguration of a new treatment is seen to be promptly followed in some by a diminution of night-sweats, in others by an improved appetite and a gain in weight, in others by lessened cough and refreshing sleep, and in others still by a better color and reviving strength, we cannot resist the inference that the treatment is upon the whole beneficial, although in some other cases it appeared to be without result.

Excluding as carefully as possible the effect of other favorable influences, it seems to me that the use of defibrinated blood has resulted in marked benefit in about one-half of the cases of phthisis, in which it has been tried, while in the remainder there has either been no improvement whatever, or none that could be confidently ascribed to the enemata. The test has been a severe one, inasmuch as in nearly every case the patient was already upon careful treatment with cod-liver oil, stimulants, tonics, quinine, etc., and the use of the blood was simply added to these. If, under these conditions, a prompt improvement has followed in a considerable number of cases, it would seem that a positive step in advance has been secured. I should hesitate perhaps, to claim such results on my own unsupported testimony. But they have been observed in the practice of others as well as myself, and even my cases were for the most part under the observation of the House Staff at St. Luke's.

Of these, one man in the third stage of phthisis who had been in hospital several weeks, and was constantly losing ground, suffered much less from sweating the night following his first injection, was entirely dry the third night, had gained a pound and a quarter at the end of the first week, and during the month which has elapsed since, has continued steadily improving.

Another, also in the third stage, who had been seven weeks in hospital, confined all the time to his bed, gained

six pounds in weight during the first fortnight after commencing the treatment, and a pound a week for the three succeeding weeks. In this case an extraordinary improvement of the appetite took place.

Another patient in the second stage maintained his weight while using the blood, but fell off a pound a week for the next three weeks after giving it up.

Another, a female patient, aged 28, entered hospital September 26th, first seen by me November 1st. Phthisis in first stage involving only right apex, but producing extreme constitutional irritation. Pulse 120, temperature high, cough very wearing, appetite entirely gone. Early in November she took to her bed and rapidly lost flesh, color and strength. Her treatment was arranged with great care to meet as far as possible every indication, but she steadily grew worse. About the first of December she began the injection of defibrinated blood, daily at bedtime. Within a week there was marked improvement. She began to gain flesh, her cheeks regained some color, her appetite returned, and her strength improved so that she sat up a little each day. The improvement continued steadily, and in six weeks she left the hospital, still coughing a good deal and with the physical signs not greatly changed, but much stouter and with a good color and a fair amount of strength.

In a case reported by Dr. Bayles to the Therapeutical Society, a girl, twelve years of age with phthisis, used the enemata of blood for a period of six weeks, at the end of which time the night sweats had ceased, the patient had begun to relish food, the cough had abated, and there had been a gain of four pounds in weight. She then went south, where she continues to improve in strength and spirits.

Case reported by Dr. A. E. M. Purdy. A young gentleman suffering phthisis in the second stage, came to this city from his home in Chicago, intending to go from here to San Antonio,

Texas, for change of climate. He had a diarrhœa supposed to be tubercular, which had resisted all treatment in Chicago, and which became so much worse while here that he was unable to resume his journey. All the means usually employed in such cases were tried by Dr. P. without success. An injection of 45 grams of blood was then ordered twice a day, increased the second day to 120 grams three times a day. In twenty-four hours from that time the diarrhœa had ceased and constipation was produced. In five days the patient was so much stronger that he started again on his journey.

Case reported by Dr. O. B. Douglas. Patient, a lady 22 years of age. Tubercular deposit in upper lobe of right lung. She coughed badly, was greatly emaciated, had no appetite, vomitted frequently, slept but poorly, and had exhausting night sweats. Pulse 132, axillary morning temperature 38.7° , respiration 36. December 8th, 1878, ordered 90 grams of blood by enema twice a day. She coughed less and slept better the night following. December 11th, a marked improvement in every particular, especially in her relish for food. Increased the injections gradually to 150 grams twice, and subsequently three times a day. January 13th, the following is noted :

"From a state of great nervous debility and mental depression, without a hope of recovery, the patient has become hopeful and cheerful, coughs less, sleeps and eats better, weight increased five pounds. The discharges seldom show traces of blood, and the odor is never more than ordinarily offensive."

I have treated quite a number of cases of simple anæmia by enemata of blood, and have had excellent results in all but one. In this case I suspect that congenital arterial hypoplasia exists, as the patient has been remarkable from her childhood for her extraordinary palor. No treatment seems ever to have been of real service to her.

The other cases were, without exception, strikingly benefited, and indeed these are precisely the cases to which the treatment is, theoretically at least, most applicable.

In one of my cases, the patient, aged 23, had had a siege of ague, lasting several months, which had completely broken him down. Anæmic bruit and venous hum were present to

a typical degree. Chalybeates were purposely withheld, and enemata of blood administered twice a day. His color rapidly improved, and in a fortnight the bruit and hum had entirely disappeared.

Two other cases in females, both exceedingly well marked, were treated by the injections alone, with only an occasional dose of medicine to meet some passing indication, and made satisfactory recoveries, one of them remaining in hospital only thirty-four days.

The following case is taken from the Transactions of the Therapeutical Society, April, 1878:

Mrs. S., aged 26, was confined three months ago, and suffered from protracted hemorrhage, extending through several weeks. Came under my care March 16th, 1878. Is anæmic to the last degree; face tallowy white, lips almost bloodless; pulse ninety-six, and very small; can walk but a few steps at a time; has not been down-stairs since her confinement; complains of shortness of breath, giddiness, and mental confusion; is very despondent; has an absolute disgust for solid food, and vomits it if taken; has been living principally upon beef-tea, milk and lime-water.

Pepsin and simple bitter tonics were prescribed with little if any benefit. On the 19th of March began the use of enemata of blood. 120 grams were taken three times a day. Patient retained the injection, the bowels on one occasion not being moved for forty-eight hours.

There was very prompt improvement in strength; within a week she was able to go out-of-doors and walk several blocks. The lips and conjunctivæ regained their color, the stomach became less irritable, the vertigo disappeared, and, in less than three weeks, the only traces of her illness remaining were some shortness of breath when going up-stairs and occasional nausea after a full meal.

On several occasions the use of the blood was omitted for a short time, and she immediately felt a decline of strength and spirits.

This patient had been under the care of a very intelligent practitioner for three months before I saw her, and it is fair to presume that the usual means for correcting anæmia had been employed. While under my care she had very little treatment except the ene-

mata, and it seems to me that her improvement is to be attributed chiefly to their use.

A gentleman, aged 68, a Doctor of Divinity, was sent to me in November last by Dr. Webster for a tormenting cough and dyspnoea, for which he had had a great deal of throat treatment. I found almost complete obliteration of the right pleural cavity, and on inquiry elicited the history of a pleurisy with effusion two years ago.

The lung had been compressed, and was bound by firm adhesions to the spine, so that it could not expand when the effusion was absorbed. The chest was greatly contracted, and the diaphragm so drawn up that the lower border of the liver was nearly on a level with the nipple. The breathing was almost wholly with the left lung. The shortness of breath, due to this cause, was increased by a profound anæmia, the result of the general derangement of health, so that the breathing was between sixty and seventy per minute. The lips and the conjunctivæ of the lids were white, and there was œdema of the feet and legs. The appetite was completely gone, and the patient was in about as wretched a plight as possible. Realizing that medicine would do very little toward re-expanding the lung, and that the shortness of breath, which constituted the principal discomfort, was greatly increased by the watery condition of the blood, I recommended no medicine whatever, but only a simple and nutritious diet, and an injection of a teacupful of blood every night. This course he pursued, except that instead of about 150 grams (5 ozs.), which I meant him to take, he divided the very liberal pint which the butcher sent him every second day into two parts, and took in reality each night about 270 grams. This quantity was perfectly well retained, but there was some fluid blood in the evacuation next morning, and the odor from the dejections pervaded the whole house. He improved, however, and in two weeks wrote me that the swelling of the feet and legs was gone, and that the appetite was better. A few days later I saw him, and on learning the quantity of the injections, directed that half the amount should be taken at night and the remainder in the morning. This did away with the nuisance referred to, and at the next report the breathing was better. He gained decidedly in strength for some time, and finally determined to stop the injections for a week and see what the effect would be. His last enema was taken Saturday evening, but by the Thursday following he was obliged to renew the treat-

ment. His appetite had left him entirely, and a little food forced down on Tuesday was vomited. He could not sleep, his breathing became again very rapid, and the œdema about the ankles returned. Wednesday and Thursday he ate nothing but a little gruel. His son then interposed, and went himself for the blood, and Thursday evening the treatment was resumed. That night the patient slept comfortably, and when I saw him on Friday morning he had taken with appetite a light breakfast. This was four days ago, and I received a card from him to day, the 18th saying that he slept well last night, and was feeling encouraged.

Supplemental rectal alimentation ought, theoretically, to be useful in dyspepsia, whether atonic or depending upon gastritis; in the first case for the reasons already dwelt upon at length, and in the second as giving to the inflamed organ partial rest. A case of atonic dyspepsia treated in this way very successfully, occurred in my private practice within the past few months. The patient, a young man about 22 years of age, of rigidly temperate habits, began last spring to run down, and soon lost the power of digesting solid food. The smallest quantity taken into the stomach brought on vomiting. He rapidly lost flesh and strength, and his appearance was that of a person far advanced in consumption. There was a good deal of epigastric pain and tenderness, but the pain did not run through to the back, and he had never vomited blood. The tongue was pale and but little furred. This was his condition when I first saw him in December. No medicine was ordered, but he was directed to take a teacupful of blood by the rectum twice a day, and to apply a belladonna plaster over the stomach. The epigastric pain and the vomiting ceased within two or three days, and solid food was taken without inconvenience. In seventeen days he gained eleven and a-half pounds in weight.

Dr. George Bayles reported recently to the Therapeutical Society, a case of dyspepsia in which the vomiting was so constant and severe, that disease of the pylorus was sus-

pected. For nearly nine weeks he was nourished wholly by injections of bullock's blood, only a little claret and water, toast-water, or tea with milk, being taken by the mouth. At the end of this time it was found that he gained in weight, and he has had no trouble since from dyspepsia.

The following case of dyspeptic asthma occurred in my private practice.

MR. R., 30 years of age, partner in a coffee importing house, of weakly frame but possessed of intense nervous energy, and a ceaselessly active temperament, his attention closely devoted to business, has been for some years subject to frequent and severe attacks of dyspeptic asthma, which leave him greatly prostrated. He often scarcely recovers from one attack before another comes on. This was his condition in the early part of last summer. Whatever good effects drugs may have produced seemed to be exhausted. I had tried every possible line of treatment, and in his frequent business trips he had consulted many other physicians in other cities. But with the demands which his business made upon him, it was scarcely possible that permanent good could result from any medication. Still, with the hope of enabling him better to withstand the wear and tear during the hot season which was approaching, I ordered for him injections of blood twice daily. He gradually increased the quantity until he used 480 grams (1 pint) a day. The treatment resulted in a prompt and decided improvement in all his symptoms. His appetite which before was capricious and irregular, became excellent, and although he continued at his business through all the hot weather, sleeping in town, and taking his meals at restaurants, he gained about eight pounds in weight, and enjoyed complete immunity from asthma. Finally, however, he got to be troubled with severe constipation, notwithstanding the amount of fluid thrown into the bowel daily, and the annoyance from this induced him to give up the treatment. Since then he has held his vantage ground in part, but he is slowly slipping back into his former condition.

The following is one of my cases transcribed from the records of St. Luke's Hospital.

Patient, William T., four and a-half years of age, was admitted October 21st, 1878. For five or six months had been running

down without assignable cause. Examination shows extreme emaciation, anæmia, enlarged liver, veins of abdomen injected, and stomach distended. Ordered : Syr. Ferri Iodid. Ext. of Malt.

November 1st.—Improving in general appearance.

January 1st.—For some days patient has been vomiting nearly everything taken into the stomach. Ordered, milk diet.

January 23d.—Not materially improving, though vomits less frequently. Patient weighs 8.5 kilos (23 lbs.) without clothes. Ordered, enemata of defibrinated beef blood, 60 grams ($\frac{5}{8}$ ij) t. i. d.

January 31st.—Weights 9.1 kilos (24½ lbs.); looking much better; running about the ward.

February 8th.—Weights 9.44 kilos (25½ lbs.). Lips red; cheeks filled out and rosy; abdomen less distended; and in every way patient looks a healthy child.

If neuralgia is, as Romberg has elegantly expressed it, “the prayer of a nerve for healthy blood,” it should offer a promising field for the treatment in question.

My own experience on the subject is very small and inconclusive. Dr. Bayles, however, has reported to the Therapeutical Society two cases of inveterate neuralgia, apparently inherited, which were greatly relieved in this way. The paroxysms were rendered much shorter and less severe. Both patients increased in weight, one 1.85 kilos (5 lbs.) in six weeks, and the other 1 kilo in the same time.

The following case of nervous exhaustion is from my private practice :

Patient, a lady, aged about 40 years. Constitution broken six years ago by prolonged ulceration of the rectum and fistula in ano. Has had frequent attacks of dysentery since. Last winter was sick for three months with a low nervous fever, which left her in a state of extreme debility. She had pain and tenderness in the epigastrium, no appetite, insomnia, giddiness, palpitation, tinnitus, and spectral illusions. Ordered 150 grams (5 ozs.) of blood by enema twice daily. This produced an immediate effect. The epigastric pain and tenderness disappeared within a few days, and sleep and appetite returned. The giddiness and palpitation soon ceased, but the tinnitus and spectral illusions continued for several

weeks. In a month she had recovered so much strength that she could row for a short time each day. No medicine was taken. She returned to town in October much improved in flesh and better than she had been for years. She was then subjected to a great drain upon her strength in settling a new house, and in the midst of it had one of her attacks of dysentery. This was promptly checked, but it left her with many of her former symptoms. She resorted again to the enemata with immediate and marked benefit, and in three or four weeks, although surrounded by very unfavorable influences, she regained all she had lost.

The following case can scarcely be called one of *supplementary* alimentation by the rectum, since the stomach did almost nothing; but it is introduced here to show the nutritive value of blood as a material for injections, and what may be accomplished with it, with almost no aid from the stomach.

PAULINA S., about 18 years of age, patient at St. Luke's Hospital, entered July 22, 1878, with some pulmonary trouble. Soon after developed symptoms of gastric ulcer, and was kept for a long time on milk diet. Finally even this was rejected, and for two weeks previous to the 1st of November she had been nourished entirely by enemata of defibrinated blood, ordered by Dr. Wheelock. At first she did well, but after a few days began to fail, and when I saw her she was apparently moribund. She was in a state of semi-consciousness, lying with the eyes half open, the corneæ glazed and the conjunctivæ injected, the tongue dry and the teeth covered with sordes, presenting the appearance of a person in the last stage of typhoid fever. The pulse was barely perceptible. She was then receiving by injection 90 grams (3 ozs.) of blood every three hours and 30 grams (1 oz.) of brandy. On inquiry it was ascertained that the blood and brandy were mixed and injected together, thus causing coagulation of the albumen and unfitting the blood for absorption. This was corrected, the blood being given alone, and an occasional teaspoonful of brandy and milk being administered by the mouth. The following day I found an astonishing improvement. Complete consciousness was restored, the countenance was bright, and there was a pulse which, though very frequent, could be easily counted. From this time recovery progressed rapidly. Brandy and milk were allowed in small quan-

tities by the mouth, and gradually other things were added, until at the end of two weeks she was placed on full diet, and on Dec. 11th was discharged cured.

Case reported by Dr. Hanks.

Patient, Mrs. B., U. S., age 33 years, mother of two children. Has never been rugged, but has generally been able to superintend her household. Has always been of a pale complexion, but has had a good appetite, and slept well.

July 29th, 1878.—I was called to prescribe for her, on account of a profuse and long-continued menstrual flow. I found her extremely weak and apparently nearly exsanguinated, with a rapid feeble pulse of 110, temperature 37.7° C. (99°), respiration 24. A constant flow of thin red blood from vagina. This has continued for one week. Her last menstrual flow was also of long duration.

The uterus was found retroverted in the second degree. The displacement was corrected, and warm salt water injections *per vaginam* were ordered. On the following day the flow still continued, and the patient was hardly able to raise her head from the pillow without fainting.

Pulse still rapid and feeble, temperature normal. A liberal allowance of brandy was ordered, and aromatic sulph. acid and morphine in small doses.

August 1st.—Same condition, pulse 120, temperature 38.3° C. (101°), vomits all food taken, ordered 120 to 180 grams (4 to 6 ozs.) of fluid beef's blood *per rectum*, three times per day.

August 2d.—Pulse and temperature the same. Patient looks and feels better. Injections have caused no pain nor uneasiness. Same treatment to be continued.

August 5th.—Patient improving, same treatment.

August 13.—Has continued the injections of blood until to-day. Has taken some food *via naturalis*, during the week. Has improved steadily during the use of the injections.

I might add many other cases in which the success of this method of alimentation has been more or less striking, but I will not occupy more of the time of the meeting. I cannot close better than by quoting from a recent report of the Committee on Restoratives of the Therapeutical Society.

The report concludes as follows :

"From the facts before them the Committee feel warranted in the following conclusions:

"1. That defibrinated blood is admirably adapted for use for rectal alimentation.

"2. That in doses of 60 to 180 grams (2 to 6 ozs.) it is usually retained without any inconvenience, and is frequently so completely absorbed, that very little trace of it can be discovered in the dejections.

"3. That administered in this way once or twice a day, it produces in about one-third of the cases for the first few days, more or less constipation of the bowels.

"4. That in a small proportion of cases, the constipation persists and even becomes more decided the longer the enemata are continued.

"5. That in a very small percentage of cases irritability of the bowels attends its protracted use.

"6. That it is a valuable aid to the stomach, whenever the latter is inadequate to a complete nutrition of the system.

"7. That its use is indicated in all cases not involving the large intestines, and requiring a tonic influence which cannot readily be obtained by remedies employed in the usual way.

"8. That in favorable cases it is capable of giving an impulse to nutrition, which is rarely, if ever obtained from the employment of other remedies.

"9. That its use is wholly unattended by danger."

THE EMBRYOGENY OF THE SYMPATHETIC.

By W. R. BIRDSALL, M. D.,

OF NEW YORK.

THE aim of this article is to give, in an abbreviated form, the contents of a contribution published in the annual volume of communications from the Embryological Institute of the Imperial Royal University of Vienna, for 1878; an article upon the theory of development of the ganglia of the sympathetic nervous system, by Prof. Schenk, Director of the Institute, and myself.¹ It is not practicable to present the plates which accompanied the original work, so we must attempt to lay the subject before our readers as clearly as possible without them.

The embryogeny of the nervous system, which within the last few years has experienced a considerable extension, still leaves in different directions many not unimportant facts to be investigated; this is true of the central, as well as of the peripheral nervous system. The least noticed division appears to be that known in general as the sympathetic. The study of the ganglia in their successive stages has always been one of the greatest of difficulties. With the sympathetic this is particularly true, as in the majority of cases where it is desired to investigate the subject more accurately, either the ganglia are found nearly or fully de-

veloped, or, at those places where the sympathetic is found, scarcely anything is to be gained that would enable us to reach a conclusion concerning the manner of its development. The desired result is not to be reached by a macroscopical preparation, for where this is possible, the sympathetic is so fully developed that the portions examined differ but little, if at all, from those found in the adult. The section method came to our assistance here, as in so many other cases; carried out in such a manner, that from a complete series of sections of the material to be examined, arranged and studied microscopically in their order of succession, we sought to discover the connection of the structures in the undissected embryo, and obtained a series of facts not to be overlooked. Their presentation forms the principal part of this article.

The essentials of the result of our examinations, which should more properly appear at the end of our article, we present as introductory, in order to make what follows more easily understood. Our researches concerning the development of the ganglia of the sympathetic, show that they do not constitute an isolated system, but stand in connection with the balance of the nervous system in respect to their mode of development; that these ganglia are to be considered as masses which have been pushed forward from out of the central nervous system; not directly out of the latter, but from the ganglia of the cerebro-spinal nerves, which, it has been shown, are outgrowths of the central nervous system. It is therefore the independence of the sympathetic system, with regard to its manner of development, which is called in question, and the theory of the dependence of this system upon the central nervous system appears to gain support from embryology.

Before we present our own results, we will refer to the available contributions which have appeared up to this time

concerning this subject. The oldest accounts before us treat so sparsely of this topic, that we can briefly condense them. In the various detailed works on embryology, as those of Baer, Reichert, and Remak, are to be found several views upon the embryology of the ganglia in general; particularly that one brought forth by Remak, according to whom the ganglia are found already formed in the mesoblast, especially at those places where they are found in fully developed animals. This, according to our present experience, can hardly be accepted even in its remotest sense, and is least applicable to the ganglia of the sympathetic. Bischoff,² in his embryology, quotes in detail the older literature, but does not give the formation of the sympathetic decidedly, from lack of the necessary technical assistance. Ackermann³ locates the origin of the sympathetic in the heart. It was formerly believed that the sympathetic was developed independently from the balance of the nervous system, as a separate and complete system. This much was determined, that the ganglionic chain of the sympathetic showed itself in a comparatively advanced condition of development, when the spinal cord had not reached a corresponding stage, but it is not to be forgotten that the method of examination which gave this result was mostly macroscopical, in consequence of which we have not a correct measure for the degree of development of the cord. Kieselbach,⁴ Lobstein,⁵ and Valentin speak in detail of the development of the sympathetic ganglia. They saw, in human embryos, nine lines in length, and in embryos of the calf and pig, from eight to eight and a half lines in length. the thoracic cord of the sympathetic, with small swellings upon it on each side of the vertebral column, and the cervical portions with the superior cervical ganglion as a small nodule. In recent times but little has been advanced concerning this portion of the nervous system, which will serve

in solving questions relating to its earliest development. We have the communication of Lubimoff¹⁴ upon the sympathetic in human embryos, completed under Virchow's direction, from which we obtain the order in which the sympathetic ganglia first appear in foetal life, together with a description of their development under far advanced formative conditions.

As an approach to the solution of our study of the sympathetic ganglia, we will mention what has been acquired, in recent times, relative to the ganglia of the cerebral and spinal nerves. Remak's⁶ view of the origin of the ganglia from the mesoblast found general acceptance. In the excellent works of Kölliker⁷ and Goette,⁸ this view is taken up, and to some extent supported. His⁹ varies, in part, from Remak's view, and holds that the ganglia of the cerebro-spinal nerves originate from the peripheral portion of the epiblast. More recently it was established, principally through the investigations of Balfour,¹⁰ Hensen,¹¹ Rauber,¹² and Schenk,¹³ on this subject, that the epiblast contains the substratum for the ganglia of the cerebro-spinal nerves, but that they develop from the axial portion of the epiblast. From this place of origin, together with the nerves, they are crowded more and more toward the periphery in consequence of the changes in growth, until they reach the permanent location they possess in the developed animal. The results of these examinations we have presented in an abbreviated form, in that they relate principally to the ganglia of the cerebro-spinal nerves, and offer little or nothing relative to the sympathetic ganglia. The reason for this appears to be, that at the time of examination of the former, nothing was to be seen of the sympathetic; this appears at a relatively later period, and its rudiments are first to be sought when the ganglia of the cerebro-spinal nerves are present, and their cells are arranged one behind

the other, in rows directed from the centre toward the periphery, as described by Schenk, and the nerves are also present, composed of non-medullated fibres.

We now pass to the consideration of our own investigations. Our examinations began with a series of preparations from a chick at the fifth day of incubation. The cerebrospinal nerves were present with their ganglia, but the ganglionic accumulations of the sympathetic were not clearly pronounced, although their rudiments were observed. It appeared as if no portion of the sympathetic chain of ganglia was present. At later stages nodules, corresponding to the thoracic cord of the sympathetic, are always to be observed on each side of the vertebræ, enclosed by an envelope of connective tissue, not far advanced in development; scarcely anything like this could be found in the chick at the fifth day, although the intervertebral ganglia were present, and considerably developed. At the point corresponding to the intervertebral foramina, where the nerve fibres passed out, the ganglionic mass was not circumscribed on all sides; the ganglion cells extending for a considerable distance in the nerve branches, as if, no longer able to confine themselves to the original limited compartment, they sought to escape from the intervertebral space, where the relations permitted, in order to take up a more distant location. On this account the consideration of a series of sections is of interest, as on certain sections the intervertebral ganglia are seen entirely circumscribed, while, on a neighboring section of the same embryo, it may be in direct connection with the ganglionic nodules of the sympathetic cord. Different connections are to be observed at different heights in the embryo, so characterized, that no true separation is to be found between the two sets of ganglia. The connection is not of nerve fibres alone; at first, ganglion cells predominate to form it, and later the nerve

filaments appear, through which the connections between the sympathetic and the other nerves found in the developed animal, is effected.

The remaining portion of the original article is devoted to a description of the plates, and the discussion of the facts they are designed to illustrate; we present some of the most important points. In a human embryo two and two-tenths centimeters long, a section, at a level passing through the kidneys, shows the spinal cord with its gray and white matter: the former, composed mostly of cells; the latter, having a punctated appearance due to the non-medullated nerve fibres seen in transverse section. Forward from the cord, and separated from it by connective tissue, lies the vertebral body with the remains of the notochord; at each side, the vertebral arch, not yet completed on the dorsal surface; between the vertebral arch and the cord, on each side is a cell mass, the intervertebral ganglia. It is right to consider them as such, for they correspond in position, are seen to be united with the non-medullated fibres of the spinal nerves, the cells possess the peculiar arrangement already described, and at a latter stage, true ganglion cells are found corresponding to this formation. Outside of the vertebral canal are masses, situated on each side and partly on the anterior surface of the vertebral body. Upon one side in the form of a drawn-out mass; on the other, collected in a little round mass. This collection of cells in the neighboring sections is at first larger, but gradually, by slight interruptions, nearly disappears. If we follow these masses, which, from their position, their connection with nerve filaments, and the changes in form of its constituent elements at later stages, we can declare are the ganglionic nodules in the course of the sympathetic cord; we find that they stand in direct connection with the intervertebral ganglia. The union is formed of embryonic ganglion cells,

lying between the nerve fibres which belong to the spinal cord. If we follow the ganglia of the sympathetic toward their central end, we find that they do not terminate abruptly, but approach with delicate prolongations, the aorta and intestine. It is true that this is far from being a completely formed plexus; but this much is certain, that we are to seek for the first trace of one in the extension of these ganglionic tracts, which lie on the walls of the aorta and the intestine. We have here consequently, the rudiment of the so-called *plexus aorticus* in the one case, and in the other, that of the *plexus Auerbachii*; particularly in those ganglionic elements which lie on the posterior portion of the intestine. The embryonic ganglion cells come in contact with the formative material of the intestine, at a stage when the tissues of the latter are not completely differentiated, in this case only the rudiments of the layer of circular fibres is shown, which is the first recognizable layer in the intestinal walls next to the epithelium. (Barth,¹⁶ Laskowsky.¹⁷) It can now be understood how the ganglia of the *plexus Auerbachii* come to lie between the two muscular layers of the intestines. The ganglion cells lie in this place in the embryo, on the already formed layer of circular fibres; soon after, a layer of longitudinal fibres develop, and in this manner the ganglia are enclosed within the intestinal walls. From what is above stated, we must conclude that the ganglia, limited through the changes dependent upon growth and formation, are crowded forward more and more, until they reach their permanent location, where they undergo the metamorphoses adequate to produce their final form and arrangement. With embryos of the rabbit, mouse, pig, and Guinea-pig, in available sections, similar results were obtained, and it was found that the groups of ganglion cells which lie nearest the periphery, were, as a rule, smaller than the older portions lying near to the central nervous system.

Another section from a human embryo, at about the same period of development, shows the *ganglion solare* (semilunar ganglion) on each side of the aorta. The intervertebral ganglia, well developed, have prolongations which run forward on both sides of the vertebral bodies. The elements of these prolongations are not completely isolated at all places; the line of separation being indistinct between them and the contiguous tissues, in consequence of their passing into one another. At other places, on the contrary, the ganglionic masses lie like little knots, in a line with each other, varying here and there in size. A great number of these groups of ganglia are arranged about the aorta; it is the *ganglion solare*, whose connection through the ganglionic masses with each other, and also with the intervertebral ganglion, is established beyond doubt. At this stage the origin of vessels is not satisfactorily shown, but bands of fibres are seen, which may be considered as tracts of nerve fibres between the ganglion cells.

A section from a chick at the beginning of the fifth day of incubation is illustrated, in the original, to exhibit the *ramus communicans* between the intervertebral ganglia and the corresponding ganglia of the sympathetic. The remains of the former direct union by cells is still present, the scattered elements lying in the course of the nerve bundles which form the present connection; at a comparatively early stage they form a regular constituent. When found in the adult, and we may with certainty expect to find them, they are to be considered as the remains of an embryonic stage. The division of the intervertebral ganglia to form the sympathetic, has taken place in the case before us, and only this remnant of their former union is visible. The intimate union of the sympathetic with the intervertebral ganglia during development, appears to explain why the ganglionic nodules of the former are to be found in

alternate spaces along the vertebral column. Particularly noticeable are the relations in the cervical region. The alternately situated nodules of the sympathetic do not appear; but in a complete series of sections, from the cervical portion of young embryos, a ganglionic mass is to be met with, in the rudiments of the sympathetic, which furnishes the formative material for all the sympathetic ganglia of the cervical region, and probably for the first thoracic ganglion. Certainly, in the remaining portions of the embryo, the contiguous ganglionic swellings are seen lying one above the other, so that the communicating fibres are almost entirely absent from head to tail; the connection during an early period is in all cases composed of embryonic ganglion cells with each other, as well as with the intervertebral ganglia. The commissures of nerve fibres between the ganglia are the product of a later formation. One can be convinced of the presence of the knotty swellings by studying a series of sections, in all portions except the cervical region, where we were unable to prove its existence. It appears that here the origin is not from the intervertebral ganglia alone, but that considerable formative material is furnished from the several not yet determined portions of the cerebral nerves, for the formation of the cervical portion of the sympathetic.

A section, chosen for illustration, from the embryo of a rabbit fifteen days old, corresponding closely to the lowest cervical region, exhibits, at each side of the trachea and œsophagus a formation consisting partly of ganglionic nodules, and partly of vessels; a white cord is visible at each side, which is directly connected with the intervertebral ganglia; they represent the spinal nerves. The ganglionic mass, on each side, has been separated into two portions by the insinuated tissues of the mesoblast. It appears as if this might be the manner in which, out of the collective

masses of ganglionic substances, the so-called ganglia originate. As the mesoblast is an agent in determining the form of the epiblast, this must be also the case, when the derivatives of the latter lie comparatively distant from the central nervous system. In this manner it can also be explained why the ganglia of the sympathetic in the cervical region do not, in many cases, exist as isolated masses, but are united with one another, as, according to the experience of the anatomist, is particularly the case between the second and third cervical ganglia, or between these and the first thoracic ganglion. It appears as if the originally united mass which forms the three cervical ganglia do not undergo separation, or the separation is not appreciable, at least externally, on account of the nerve fibres which lie between the corresponding ganglia. Certainly the condition described suits in those cases, where the union of two nodules has taken place, and still persists as a permanent condition, the elements of the mesoblast between them also remaining. Manifold abnormalities in other parts of the sympathetic cord may be explained by this discovery, which also gives more or less support in confirmation of our views concerning the development of the sympathetic.

We conclude, with the consideration of what is shown in a transverse section, through the pelvis of an eighteen day embryo of a rabbit. It exhibits the *plexus sacralis* or pelvic plexus, and is worthy of attention, as it shows the relations where such large collections of ganglionic material exist in other regions, as well as in this one. Forward from the vertebral body lie two ganglia, belonging to the sympathetic; forward from these, and an intervening vessel, are two other ganglionic masses, which form the beginning of a chain of knots, the groups of which become smaller and smaller as they extend forwards by the side of the intestinal canal, and on, to the uro-genital tract, being connected by

ganglionic substance only; the highest powers failing to exhibit connecting nerve fibres. They are surrounded everywhere by mesoblastic tissue. The rudiments of the uro-genital tract present a mass of elements, formed from the mesoblast, in which are four lumina; the two largest are known as Müller's ducts; the two small ones anterior to these, are the Wolffian ducts. In front of this mass lies the bladder, with the tissue in its walls partly differentiated. The ganglia extend from each side, between the mass containing the Wolffian and Müller's ducts, and the bladder. Here the ganglia grow smaller, until only a few scattered ganglion cells are to be found, lying between the connective tissue elements. When we compare these ganglia with those found in adults in this region, we see that even in the embryo there are a good many present; the nerve fibres are less developed, however, than in the adult. In fact these are absent for a long time during embryonic life, and were absent in this embryo of the rabbit at the eighteenth day.

No particular differences are found in the embryo, between the structure of the sympathetic ganglia and the ganglia of other portions of the nervous system.

All that has been presented goes to satisfy us, that we must consider the sympathetic as dependent in its development upon the rudiments of the cerebro-spinal nerves and their ganglia. The later changes of growth in the rudimentary sympathetic coincide in general with the process which goes on in the cerebro-spinal ganglia; in that the neural elements, in the farther development of the embryo, are crowded more and more toward the periphery.

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IS GLAUCOMA EVER OF SYMPATHETIC ORIGIN ? *

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WHETHER glaucoma is ever sympathetic in its origin seems, as yet, to be an unsettled question among Ophthalmologists. Some would answer the question in the affirmative, others declare such a thing to be quite impossible, while others again prudently reserve their decision for further evidence.

Stellwag seems to have met with cases of sympathetic glaucoma, and, although he does not call them by that name, he clearly indicates their sympathetic origin. He says, under the head of Sympathetic Diseases of the Eye, (Stellwag, as translated by Drs. Roosa, Bull and Hackley, Fourth Edition, page 297), "Cases also occur in which a rapidly increasing amblyopia is matured by development of a glaucomatous excavation of the optic disc. The last named condition is found relatively most frequently in older individuals, and is always connected with a marked increase of hardness of the globe. We might almost believe that it is the rigidity of the sclera that has forced the process into a simple glaucoma."

Now, if Stellwag does not mean glaucoma by the above

(* Read before the Medical Society of the State of New York at its seventy-third annual meeting, February 4th, 1879.)

description, I confess I am unable to tell what he does mean. But he finds it necessary to apologize for its occurrence in such cases, by intimating that the disease would be something else were it not for the "rigidity of the sclera," pertaining to old age, which forces the process into a "simple glaucoma." If the disease is a simple glaucoma, and is caused sympathetically, by an inflammation of the fellow eye, I do not see why we should hesitate to call it *sympathetic glaucoma*, regardless of any secondary circumstances, which caused it to take on that form.

Horner commits himself frankly and unmistakably to the opinion that there is such a disease. In the discussion of a paper on Sympathetic Ophthalmia, by Critchett, at Heidelberg, 1863, he stated that he believed that "besides the forms of sympathetic affection quoted by Critchett, Graefe, and Donders, an amblyopia may also occur in the second eye through pressure excavation, a so-to-speak *sympathetic glaucoma*." (*Zehender's Monatsblätter*, 1863, p. 450). He evidently had met with the same kind of cases spoken of by Stellwag.

Schmidt of Marburg, who writes the article on glaucoma in *Graefe und Saemisch's Handbuch der Augenheilkunde*, seems to be in a state of uncertainty on the *sympathetic* question. He has seen (Vol. V, part 1, page 41), "chronic, inflammatory *secondary* glaucoma supervene upon sympathetic irido-cyclitis," and quotes Pagenstecher as having "observed a perfect picture of acute glaucoma after a sympathetic ophthalmia." Again he says, (page 71), "Finally, we have yet to say, whether, through another kind of inflammation, as irido-cyclitis in one eye, a glaucomatous process can be excited in the other eye in a *sympathetic* way. If we, according to our views of the origin of glaucoma, do not dispute the possibility of this occurrence, no unequivocal observations exists at present which offer a better explana-

tion. This, at all events, is certain, that through chronic internal inflammations of the one eye, existing glaucomatous disease in the other eye may be increased."

Mauthner must be ranked with those who positively disbelieve in the possible sympathetic origin of glaucoma. He says, "The question is *not*, do we see eyes affected by sympathetic inflammation finally lost with glaucomatous symptoms, but whether primary glaucoma occurs as a *sympathetic inflammation* in the sound eye." This he answers very decidedly in the negative.

He goes on to say, "It not infrequently happens after an operation upon an eye affected by glaucoma, that within a very short time the otherwise healthy fellow-eye becomes glaucomatous. The question arises, "Is the outbreak of glaucoma in the second eye due to sympathy similar to the sympathetic inflammation that follows an operation on an eye, the disease *not* being glaucoma, and the operation being various?" This important question he also decides in the negative. He tells us that sympathetic glaucoma was first mentioned by von Graefe in 1857. He says that Drs. Horner, Mooren, Coccius, Carter, H. Müller, Pomeroy, and many others have seen cases, and have accepted von Graefe's theory in regard to them. He states that "Maats does not concede, and Brecht doubts the accuracy of von Graefe's diagnosis in the case in question." Mauthner formulates the following as his *leaning*. "Acute glaucoma, that is, primary glaucoma, with the same peculiar, acute, inflammatory symptoms as are expressive of sympathetic inflammation is very doubtful, and *not proven*."

Schweigger is also among the unbelievers. He says, (third edition, Farley's translation, page 351). "The only disease which can positively be said to cause sympathetic inflammation is irido-cyclitis. All other statements on the subject, as, for instance, that after operation for glaucoma in one eye

sympathetic glaucomatous inflammation may occur in the other, must be regarded as based upon little more than assumptions. If a few days after iridectomy in one eye an acute, glaucomatous inflammation appear in the other, this accident certainly may be a very unpleasant surprise; but the circumstance that the operation in the first eye and the inflammation in the second eye occur only a few days apart, argues against the suspicion of a sympathetic connection. For in ocular inflammations whose sympathetic origin is demonstrated, it is not *days* but *weeks*, before the inflammatory process proceeding from one eye and following the course of the ciliary nerves reaches the second."

Now, whether the outbreak of acute glaucoma in the fellow eye, after an iridectomy upon one eye for glaucoma is sympathetic or not, nothing is more certain than that it very frequently occurs. It has happened one or more times in the practice of almost every Ophthalmologist with whom I am acquainted. It has occurred in the practice of Dr. C. R. Agnew, in *seven* out of *twenty-seven* possible cases, or in more than twenty-five per cent., within three days after the iridectomy upon the first eye. In two of these cases it occurred within twelve hours. Four of the eyes operated upon *first* had acute glaucoma, one had chronic glaucoma, and the other two had glaucoma absolutum. The fellow eye in five of the cases had more or less of the symptoms of chronic glaucoma. In *two* cases, however, one eye was operated upon for acute glaucoma, while the fellow eye was, objectively and subjectively, *perfectly normal*, if we except errors of refraction. In six out of the seven cases the eye secondarily attacked was operated upon with little or no delay, and in each case the recovery was rapid and the vision became as good as before the attack. In the seventh case iced cloths and atropia were applied, and by the time we were ready to operate, the eye was so much improved that we decided to

defer the operation, and the attack passed off without operation in a few days, with recovery of vision. In this class of cases much may be due to the excitement attendant upon an operation, to mental anxiety, to loss of sleep, to the hyperæmia of the eye induced by the anæsthetic employed, to the shutting up of both eyes with bandages, and, possibly, to the ophthalmoscopic examination previous to the operation, but I doubt very much whether, if all these causes were in operation, and the iridectomy upon one eye were left unperformed, we should have the outbreak of glaucoma in the fellow eye in anything like so large a proportion of cases.

But it is with sympathetic glaucoma of another kind that I wish more especially to deal in this paper, namely, a glaucoma occurring under circumstances where we should have expected a sympathetic iritis, or irido-cyclitis. In a very large number of cases of glaucoma observed by me at the Brooklyn Eye and Ear Hospital, the Manhattan Eye and Ear Hospital, and in the private practice of Dr. C. R. Agnew, I have met with but two such cases, and both of these having occurred in the private practice of Dr. Agnew, he has kindly consented to my reporting them to this Society in full.

They are as follows:

CASE I. *Foreign body in right eye; severe inflammation in both eyes six months later; simple glaucoma in left nearly three years later; enucleation of right eye, and iridectomy upon left; the disease arrested.*

April 17, 1874.—J. McG., æt. 56, engineer, states that three years ago, while examining the valves of the *Colorado*, he was struck in the right eye by a piece of steel. This was removed, and he enjoyed good vision until about six months later, when he observed a spider-like appearance in the air, and his daughter noticed a discoloration of the iris of the injured eye. Soon after that he had an attack of what his physician called "erysipelas" in both eyes, and after a severe illness he recovered, with total loss of sight in his right eye. The vision of the left eye was as good as ever, and

remained so until two or three weeks ago, since which the sight has gradually failed, without pain or inflammatory symptoms.

Present Condition.—Right eye has cataract, total synechia posterior, discoloration of iris, and no perception of light; the tension normal. Left eye has vision $\frac{5}{200}$ without a glass, and with $-\frac{1}{10}$, vision $\frac{20}{80}$. The pupil is dilated and sluggish, but there is no bulging forwards of the iris nor apparent increase of tension. The visual field is contracted. The ophthalmoscope shows a narrow ring of choroidal atrophy around the optic nerve, and there is typical glaucomatous cupping of the disc 1.09 mm. in depth. No other marked deviation of the fundus from the normal. In the afternoon of the same day the patient was placed under ether, the right eye enucleated, and an iridectomy upwards performed upon the left. There was some bleeding into the pupil. The eyes were dressed with charpie and a flannel bandage. The next day the wound was healed, the aqueous regenerated, and the blood absorbed from the anterior chamber. On the third day catarrhal conjunctivitis set in. The bandage was removed and a shade substituted, and directions given to wash the eye frequently with tepid water. On the fourth day there was considerable chemosis and decided tension. Iced cloths were ordered, and two leeches were applied to the temple. A drop of four-grain solution of sulphate of atropia was also applied, and the pupil became very widely dilated. On the sixth day there was less increase of tension and less swelling of the ocular conjunctiva. From this time the inflammatory symptoms gradually abated, and on the fourteenth day the chemosis had entirely passed away and only the region of the wound remained vascular, a number of blood-vessels radiating from the cut. He was then furnished with colored coquille glasses and ordered to go out for a walk every day.

The patient presented himself at Dr. Agnew's office April 27, 1877, or three years after the operation, when the following note was made. Vision= $\frac{20}{100}$ with $-\frac{1}{15}$ — $-\frac{1}{4}$ c, ax 90° . Tension normal; beautiful, broad, peripheral iridectomy; no pain or other inflammatory symptoms since recovery from the operation. The ophthalmoscope shows the same appearances of the fundus as before the operation, some delicate floating bodies in the vitreous, and a few small, dot-like corneal opacities.

When the enucleated eye was cut open, a small foreign body was found embedded in a hardened lymphoid mass lying in contact with the ciliary region, and there was total detachment of the retina.

CASE II.—*Traumatic injury of left eye followed by atrophy and bony plate; Acute Glaucoma of right eye one year after injury of left. Enucleation of left eye and iridectomy upon right. Vision unchanged.*

April 11th, 1876.—J. Van H., æt. 64, salt inspector, fourteen months ago, had his left eye struck by a piece of steel which flew off from a chisel, while trying to get the cover off a tin freezer. This fragment of steel remained in the eyeball thirty-seven days, and then worked its way out on a poultice. A wash of sugar of lead and opium was used the first ten days, and then, up to the end of the fifth week, the eye was constantly poulticed with slippery elm and flax-seed. After the sixth week nitrate of silver was applied to the eye, and each application caused severe pain.

The patient resumed his work of inspecting salt about three months after the accident, and continued it up to two months ago, when he was obliged to give it up on account of his other eye. The right eye was somewhat weak and a little red occasionally through the summer, but was not very troublesome until three months ago when he caught cold, and the eye became red and slightly painful and the sight very foggy. Belladonna was dropped into the eye two or three times, but has not been used since. The eye got better, but soon got worse again. The cloudiness has grown much worse during the last two weeks, but still clears up occasionally so that he sees very well. At this juncture he came for the first time under our observation.

Present condition. $V = \frac{1.0}{100}$. No improvement with glasses. Tension much increased. Pupil dilated and fixed. Much deep ciliary injection. Anterior chamber has a turbid look. There is so much diffuse opacity of the dioptric media that the retinal vessels and optic disc cannot be seen, there being only a faint reddish reflex from the bottom of the eye.

Left eyeball atrophied.

In the afternoon of the same day the patient was placed under ether, and the shrunken left eyeball enucleated.

The patient was unwilling to have a simultaneous iridectomy done upon the right.

April 17th.—There being no improvement in the condition of the right eye, the patient was again placed under ether, and a broad iridectomy upwards performed. The iridectomy knife was so withdrawn as to allow the aqueous to escape very slowly in order to avoid too sudden a lessening of the intra-ocular pressure.

A slight prolapse of the iris was produced by making delicate pressure on the scleral margin of the wound, and the introduction of iris forceps into the anterior chamber was thus avoided. Dressed with charpie and flannel bandage.

April 21st.—Had no pain in the eye since the operation until last night ; it is now a little more red ; counts fingers. Applied two leeches to temple.

April 24th.—Has had no pain since last date. Anterior chamber a little too deep. Counts fingers at six feet.

April 29th.—No atropine has been used in this case. There is still some ciliary injection, and considerable diffuse opacity of the cornea. $V = \frac{20}{200}$. Patient allowed to go home.

Dr. William Cheatham, who examined the enucleated eye in Dr. C. Heitzmann's laboratory some months later, makes the following report :

“Eyeball reduced to one-third its normal size ; hard, irregular in shape. The corneal region shows deep depressions produced by irregular cicatrices. The lens is absent, and very little iris remains. The hyaloid body is changed into a myxomatous tissue. The choroid is thickened, and almost entirely changed into a dense connective tissue in which there are embedded irregular pigment granules and trabeculæ of bone. In a mass of cicatricial tissue in the anterior part of the eye is the folded capsule of the lens, and connected with it the retina, scarcely recognizable as such. Optic nerve small ; nerve fibres almost all changed into connective tissue.

Now it may be that in neither of the cases, so-called sympathy had anything to do with the causation of glaucoma in the fellow eye. It must be conceded that, possibly, each of the eyes might have been attacked by glaucoma at the same time and in the same manner that they were, and that the disease would have pursued the same course in every respect, that it did pursue, had the other eye in each case been perfectly sound. We are, in medicine, constantly in danger of confounding the *post hoc* with the *propter hoc*, and the wisest among us is often unable to discriminate with certainty betwixt the two. But it seems to me that in both cases the indications that glaucoma in the fellow eye was

the direct consequence of the condition of the injured eye, are about as clear as we could well have them in such cases. At any rate, nothing could be more certain than that *if the disease in the secondarily affected eye had, in either case, been irido-cyclitis instead of glaucoma, no one versed in Ophthalmology would have entertained any doubt, for a moment, that the disease was sympathetic in its origin.*

ELEMENTARY LESSONS IN ELECTRICITY.

By A. FLOYD DELAFIELD, A. B.

III. We have seen how, by rubbing two dissimilar substances together, a difference of electrical potential is produced between them. We tested this difference by holding one of them to a small body free to move, which was repelled as soon as it had acquired a charge of electricity by contact with the rubbed body.

The experiments I have described only show that glass and sealing wax when rubbed with silk have their potentials respectively raised or lowered. With more elaborate apparatus we can shew that the silk has its potential correspondingly and equally lowered or raised. From what has preceded we know that :

1. A difference of potentials can be produced by friction of two dissimilar substances.

If we use in these experiments glass, hard rubber, sealing wax, sulphur, paper, flannel, silk, wool and other substances, we shall also find that :

2. It depends entirely on the nature of the substances rubbed together what difference of potentials is produced, and also which of the two substances will have its potential raised, and which lowered by the friction.

3. We can observe differences of potential in substances by touching them with light movable bodies, which then show attractions and repulsions.

IV. Let us now consider another method of developing electricity, namely; that of placing two substances in contact or in a liquid. It is supposed that any two substances under these circumstances will shew a difference of potentials; but only a few, namely the metals, carbon, some gases, and a small number of other substances shew enough difference to be observed by our most delicate instruments.

Even the greatest differences of potential obtained by this method are far smaller than those produced by friction; so much smaller, that the pith ball apparatus described above would not be affected by them. They are, however, observed by delicate instruments called electrometers.

In the most sensitive of these, called Thomsons' Quadrant Electrometer, a light rod or needle of metal is suspended horizontally by a fine wire over four pieces of brass, forming the four quadrants of a circle. The opposite quadrants are connected by wires, and adjacent ones insulated from each other. All four are insulated from the rest of the instrument, and the whole is covered with a glass shade. The suspended rod is kept at a high positive potential by an arrangement not necessary to describe here, and a small mirror is attached to it, which reflects on a screen a ray of light from a lamp, thus betraying the slightest movement of the rod.

With such and similar instruments we can observe that differences of potential are really produced by the mere contact of different substances. It is not necessary to detail these experiments here; it will be sufficient to shew how the electrometer described is used to measure the differences of potential produced in ordinary galvanic batteries.

If we plunge a zinc and a copper plate in water, and connect them by wires with the pairs of quadrants in the electrometer, we shall find that the needle turns towards the quadrants connected with the zinc, and away from those connected with the copper plate.

We have thus evidently a difference of potentials between the poles of the battery, the potential of the zinc being lowered, and that of the copper raised. The behavior of the needle is precisely that of the pith balls described above. A pith ball of raised potential repelled one of raised potential and attracted one of lowered potential, and the needle of raised potential is repelled or attracted in the same way.

No difference can therefore be observed between the electricity developed by friction and that of the galvanic cell; a much greater electromotive force is produced by the friction than by the cell, but the same means can be and are employed to measure it in both cases.

If, instead of a single cell, we take several, connecting the zinc of one with the copper of the next, and the terminal plates with the quadrants of the electrometer, as before, we shall find that the electromotive force produced is proportional to the number of cells.

If for a zinc and a copper plate we substitute different pairs of plates, such as zinc and platinum, zinc and silver, silver and copper, etc., we shall find that the difference of potentials produced depends entirely on the metals used, and that differences in the size of the pieces of metal employed make absolutely no difference in the electromotive force of the pair.

Varying the liquid in which the metals are plunged, it will be found that the nature of the liquid, if it be any of those used ordinarily in the construction of galvanic cells, affects very slightly the differences of potential of the metal pairs.

We have here then the same result as with the friction of dissimilar bodies, namely :

Electromotive Force depends on the nature of the substances employed to produce it, and not on their size.

V. So far we have only considered the production of differences of potential ; we shall now discuss the means necessary to maintain such differences in such a way that, when the points of different potential are connected by a wire, a continuous current may flow from the point of higher potential to the other.

In attacking this problem, we may be sure at the outset that unless we expend continuous work we cannot keep up a continuous current ; some apparatus must therefore be used by means of which work can be applied to this end.

The ordinary frictional machines are forms of such apparatus ; the glass and silk or leather are so contrived that we can rub them together as long as we choose.

If we connect the prime conductor or metal cylinder which collects electricity from the glass with the rubber by means of a chain, a current will flow from the prime conductor to the rubber through the chain, and will continue to flow as long as the machine is worked.

To obtain a continuous current from a pair of metals in a liquid, we have recourse to the difference of the chemical action of the liquid on the two metals, and we choose the metals and liquid so that the liquid shall act strongly on one and not at all on the other. We can thus secure a great amount of work for our current—far greater than we can apply to this purpose by means of the frictional machine, where nearly all the work is wasted.

We must not forget, however, that the work thus applied, while it strengthens the current, has absolutely nothing to do with the electromotive force produced in the apparatus ; as we have already stated, this depends on the materials used.

VI. The production of currents by chemical means is accomplished by apparatus called Voltaic or Galvanic, after two scientists who discovered its original forms.

In practice several different combinations of metals and liquids are employed for the purpose of producing electricity. The first combination used was one of copper, zinc, and salt and water. Afterwards dilute sulphuric acid was used instead of the salt solution. It was found, however, that while a continuous current could be kept up by the action of these liquids on the zinc, the current was not constant; after it had passed for a time, its strength was much less. This is due to the fact that the liquid is decomposed by the action of the current, and the copper becomes covered with hydrogen.

The presence of gas on the copper not only prevents, mechanically, the contact of metal and liquid, but also acts just as would another battery opposed to the original one—the zinc-hydrogen pair having an electromotive force opposed to that of the zinc-copper pair.

The phenomenon of the metals of a battery becoming covered with gases, which produce an electromotive force contrary to that produced by the metals, is called polarization. The same term is applied to similar phenomena occurring in other cases.

To get rid of the polarization of batteries, Daniell separated the metals by placing one of them in a cup of porous earthenware, and then put a solution of sulphate of copper in the vessel occupied by the copper, while that occupied by the zinc contained as before dilute sulphuric acid. It was found that the hydrogen bubbles, instead of clinging to the copper plate, decomposed the sulphate of copper, the copper thus set free being deposited on the copper plate, while the sulphuric acid passed through the pores of the earthenware to the zinc, so that as long as any sulphate of copper was left, the action remained constant, or nearly so.

After this Grove invented a battery similar to Daniell's, replacing the copper by platinum and the sulphate of copper by nitric acid.

In this battery the nitric acid is reduced by the hydrogen set free, and fumes of nitrogen tetroxide escape.

Bunsen substituted carbon for the platinum in Grove's battery, leaving it otherwise the same.

Since then a mixture of potassium dichromate, sulphuric acid and water has frequently been substituted for nitric acid in Bunsen's battery. By this means the fumes of nitrogen tetroxide are avoided, but otherwise the battery is inferior to Bunsen's, and it is going out of use.

In the Dipping batteries carbon and zinc are used without a porous cell intervening, and the liquid is the dichromate mixture just mentioned.

In the Leclanché battery manganic dioxide replaces the nitric acid in Bunsen's battery, and chloride of ammonium solution the dilute sulphuric acid.

The form of battery most in use in this country is called the Gravity battery. It is constructed in various ways, one of which is as follows: A cylindrical glass jar is about three-quarters filled with a solution of zinc sulphate. In the bottom is placed a piece of copper, to which is fastened the end of a piece of insulated wire, and this wire is led up above the edge of the jar. Some lumps of copper sulphate are thrown on the copper plate, and then a piece of zinc is suspended in the jar, so that its under surface is about half way from the bottom of the jar. It is found that the difference in the specific gravities of the copper and zinc solutions is sufficient to keep them apart, and it is from its being so constructed as to take advantage of this fact that the cell has its name.

The Siemens-Halske battery is similar to the gravity battery, except that a diaphragm of papier-maché is used to still further ensure the separation of the two solutions.

A CASE OF OBSTINATE ULCERATION OF THE
NECK OF THE UTERUS CURED
BY GRAFTING.*

WITH A LITHOGRAPHIC PLATE.

By R. W. AMIDON, M. D.

HOUSE PHYSICIAN, NEW YORK HOSPITAL.

THE patient, a prostitute, aged twenty years, first came under notice as a case of pelvic peritonitis September 17, 1878. As such she was treated for the space of two months, and as this part of her history presents nothing of interest it will be omitted.

November 3d.—The peritonitis having subsided, some pelvic pain and considerable leucorrhœa still remaining, a vaginal examination with Cusco's speculum was made. There was some yellowish mucus in the vagina. The neck of the uterus was very much enlarged and hard. Around the os was a circular ulcer 22 mm. ($\frac{7}{8}$ in.) in diameter, longer in the vertical. The surface of this ulcer was studded with bright red, healthy granulations. There was no attempt at repair evinced at the line of junction between the healthy tissue and the ulcer, which was marked by a slight furrow. The os occupied the centre of the ulcer, was of normal size, and from it oozed a slight, tenacious, yellowish discharge. From this time till January 23, 1879, the ulceration and endometritis were assiduously treated in a variety of ways. Among the methods employed were local appli-

* Service of Dr. Woolsey Johnson.

cations of a solution of nitrate of silver, 1.20 to 30., solid stick of nitrate of silver, tincture of iodine, gallic acid and glycerine, all of these being accompanied by douches, containing at different times, pinus canadensis, glycerine, and carbolic acid.

The only result accomplished by this treatment was a cessation of the discharge from the cervical canal, the ulcer remaining undiminished in size, and presenting the same healthy appearance. Not being able to see any pathological difference between a healthy ulcer on the neck of the uterus and one on the leg, I decided to try grafting of mucous membrane as a last resort. The operation was done as follows:

The patient being on her back, a Cusco's speculum was introduced, and the cervix brought into view. Then, with a long pair of mouse-toothed forceps, a small fold of mucous membrane, protruding from the left side of the vaginal wall between the separated valves of the speculum, was pinched up and cut off with a long pair of curved scissors. This piece of mucous membrane was cut in two, and, the granulations on the ulcer having been scratched below and to the left of the os, the pieces were imbedded in the granulations by means of an instrument used for tying or twisting deep sutures. Another piece of vaginal mucous membrane was cut off and imbedded in the granulations above the os.

Having made these grafts, and wishing to secure their adhesion, the speculum was left in position, and the patient kept on her back for one hour. By this means all friction between the ulcer and the vaginal wall was avoided, and the young grafts were protected from any acid secretion. At the end of this time, the patient having experienced but little inconvenience, a large tampon of absorbing cotton, slightly moistened with pure glycerine, was placed against the ulcer, and the speculum was withdrawn. Strict quiet in



Ulcer of cervix before grafting.



Location of grafts.



Four days after grafting.



One week after grafting.

bed was enjoined, and the tampon was removed the next morning.

January 24th.—The patient remained in bed all day, and had no pain.

January 25th.—The parts were examined again with the speculum. The cervix had a swollen look, and was covered by a thin muco-purulent discharge, giving it a hazy, veiled appearance. Considerable pain was caused, so a thorough examination was not made.

January 28th.—Another examination was made with the speculum. Parts not now sensitive. On bringing the cervix into view, it seemed at first as though the ulcer was partially covered by a thin, opaline discharge. Repeated sponging and wiping did not remove this appearance, however, and closer observation showed it to be a pellicle of newly-formed mucous membrane, which had originated from the three grafts. The remainder of the ulcer still retained its red, granular appearance.

February 1st.—Made another examination with the speculum. The ulcer was all covered by a thin, semi-transparent coat of new mucous membrane, except a narrow rim just about the external os. A small piece of vaginal mucous membrane was now snipped off as before, divided in two, and a piece placed in each external angle of the os. A tampon with glycerine was placed against the os, and the speculum withdrawn.

February 4th.—The patient's condition is very much improved.

February 5th.—The patient says she feels as well as ever. Has no pain at all, and feels strong.

March 10th.—When last examined the site of the ulcer was completely covered by new mucous membrane. The patient is entirely well.

THE USE OF THE ACTUAL CAUTERY IN MEDICINE.

By E. C. SEGUIN, M. D.

THE question, "Where can an account of the actual cautery be found," is so often asked me by students and practitioners, that I am led to believe that a brief statement of the mode of using this powerful agent in medicine, and an estimate of what it may reasonably be expected to accomplish, may prove interesting.

First, as to the instruments and mode of application used in past times. A very incomplete study of the literature of the subject reveals the fact that cauterization was used by the oldest physicians, and that, with remarkable oscillations, it has disappeared and reappeared in medical and surgical practice in past centuries.

About the end of the last century the celebrated French surgeon, Percy, made an elaborate report upon the subject of cauterization in general, in which he criticised the forms of cautery, and their mode of application. His favorable report gave a great impetus to the use of this remedial agent. Surgeons have used it more than physicians, and the latter have continued to employ blisters, cupping, etc., for purposes of counter-irritation.

Most various forms of cautery have been employed; olive, crescentic, linear, etc.

Numerous materials have been employed to make the cautery; iron, silver, gold, platinum, each metal being supposed to possess special advantages. The introduction of the platinum cautery is generally attributed to Dr. Brown-Séquard; but I find that Hoppe, a German physician, proposed this apparatus in 1847.* However, it is to Brown-Séquard that we owe the demonstration that a platinum-tipped cautery is superior to the ordinary instrument because it does not become oxidized and rough.

Cautery-irons made of steel, with variously shaped tips are still generally employed by surgeons and by veterinarians, but physicians who see most of diseases of the nervous system, are unanimous in their approval of the platinum tip.

The methods of using the cautery have been different at various times, and in the hands of various physicians and surgeons. The ancient method which prevailed up to about 1830, and is still in vogue, was to burn deeply; to use force in applying the instrument, and thus to produce a slough which separated with suppuration. This severe application was made purposely, in accordance with the prevailing doctrines, which taught that suppuration was useful for the removal of disease. In late years deep cauterization has been used under the erroneous impression that a greater degree of irritation was thus produced.

It is frequently stated, and I myself taught, that superficial cauterization, the method now chiefly employed in medicine, was introduced by Brown-Séquard. This is an error, since Jobert† (de Lamballe) as far back as 1838, described his "*cautérisation transcurrente*." Valleix‡ used superficial burning in the treatment of neuralgia about the

* Hoppe. Das Feuer als Heilmittel, oder die Theorie des Brennens in Heilkunde, Bonn, 1847; cited in *Dict. des Sciences Méd.*, t. XIII.

† Jobert. Etudes sur le système nerveux. Vol. II, p. 648, Paris, 1838.

‡ Valleix. Traité des Névralgies, Paris, 1841.

same time and later ; and an elaborate essay upon the same mode of application (more especially for neuralgia) was published by Nota,* in 1847, before Brown-Séquard had become engaged in the practice of the specialty in which he has since achieved such fame.

Jobert, Valleix and Nota held that the cautery (made of steel and intensely heated) should be applied very lightly, in parallel strokes, over the nerves which were the seat of pain. They deprecated destroying the skin and causing suppuration. Their results in neuralgia were very remarkable.

At the beginning of his practice, Brown-Séquard used the older, severe application, and the moxa (treatment of Charles Sumner). Thus, it appears that superficial cauterization as practised by Jobert and Nota, had fallen into disuse prior to 1870.

I come now to my own knowledge of the cautery and its application. When I had the privilege of studying with Brown-Séquard, in Paris, during the winter of 1869-70, he taught me the use of this counter-irritant. He was employing it daily in various diseases, organic and functional, of the nervous system, with apparently admirable results. His instrument consisted in an olive-pointed steel cautery-iron, about thirty centimeters long, the olive being about 15 mm. in diameter at the base, and carefully covered with platinum. He heated this instrument almost to a white heat in a grate-fire, and applied it with extreme rapidity and wonderful lightness and certainty of touch to the scalp, mastoid regions, back of neck, spine, track of various nerves, etc. He taught me that superficial counter-irritation was preferable for several reasons: 1, The greatest effect upon nerves was thus obtained, because the terminal filaments and terminal organs of sensory nerves are more sensitive than their

* Nota. *Union Médicale*, 1847.

trunks; 2, Prolonged pain and suppuration were avoided; 3, Patients were able to go about immediately after the operation. He also insisted upon the use of platinum-tipped cauteries because their surfaces did not oxidize and scale as did those of steel, and thereby a smoother and more superficial burn could be obtained.

In 1870 Messrs. Tiemann of this city made for me, after my indications, platinum-tipped cauteries, similar to Brown-Séquard's, and I used them until 1876 with satisfaction. Since 1872-3 they have been made by all instrument makers; some olive-pointed, others button shaped, etc. Fig. 1 represents the olive-pointed platinum-tipped cautery.



FIG. 1. Platinum-tipped cautery of Brown-Séquard.

The only serious drawback to the use of this form of cautery is the mode of heating. In order to obtain almost a white heat, a strong bright grate or range coal-fire is needed. In winter this can be had at all times in private houses and in our offices, but in summer the physician is obliged to have a fire made purposely, or to take his patient into the kitchen (as I have often done). Besides, grate fires are not to be had in hospital wards. Another disadvantage of this cautery is that through repeated heating the iron part of the instrument is gradually worn away, so that the platinum cap ultimately becomes quite loose. In other respects this instrument is excellent; it is well balanced, and can, after some practice, be applied most lightly, so as to merely shrivel the cuticle; it is sufficiently small to be carried anywhere with other instruments, or in a deep pocket.

In 1876 a better instrument was introduced here by my friend, Dr. James J. Putnam, of Boston. This, the compound blow-pipe gas cautery, a modification of an English instrument, is represented in Fig. 2.

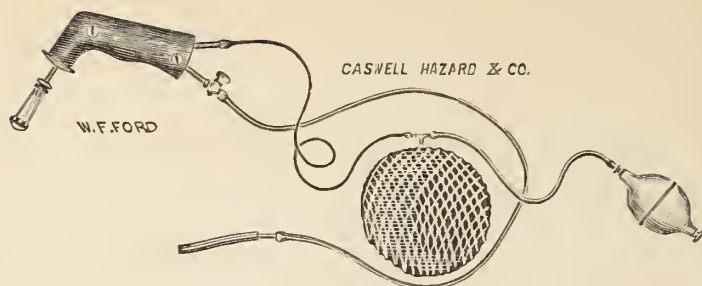


FIG. 2. Gas blow-pipe cautery of Dr. Putnam.

The instrument was exhibited before the American Neurological Association at its second annual meeting, June 7th, 1876, and a description of it was published with the Proceedings of the Association, in July, 1876.* I quote Dr. Putnam's concise description of the instrument: "It consists of a compound blow-pipe with an appropriate handle, to the end of which a small platinum cup, fastened by three stout platinum wires to a brass collar, could be attached. A long and fine rubber tube ending in a brass tip for attachment to an ordinary fish-tail burner, carries the gas; a steady stream of air is pumped in by the aid of a rubber band-ball and a receiver of very distensible rubber, in fact, an ordinary toy balloon covered by a good-sized bag of netted twine.

"The advantages of the instrument over others, consists in its adaptability to almost any place where it is desirable to use the cautery, and the ease with which almost a white heat can be maintained for any length of time."

I soon procured one of these instruments and used it with great satisfaction for nearly two years. For practitioners in cities and large towns it is very available, as it can be set going wherever illuminating gas can be procured. For physicians in small towns and in the country it is useless.

* *The Journal of Nervous and Mental Disease*, Vol. III, 1876, p. 434.

Last year, however, a still more perfect and universally applicable instrument was placed at our disposal. Paquelin's benzine cautery, (Fig. 3.) designed for surgical pur-

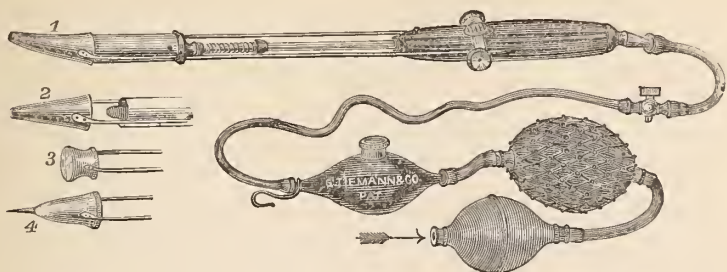


FIG 3. Paquelin's benzine platinum cautery.

poses, is admirably adapted to medical uses. It consists of a straight handle containing a blow-pipe, and bearing a variety of platinum tips. Those for surgical purposes are pointed or flat in coarse imitation of knives. The tips suited for counter-irritation are the olive and the button. The olive or cone in my own instrument measures 22 mm. in length, and 12 mm. in diameter at its base. (1). I had one side of it turned up so as to make the olive somewhat keel-shaped in one profile.

The button-shaped tip (3) is like a miniature cook's cap, measuring 13 mm. across the top, and 8 mm. in height. The upper rim of the cap projects nearly 2 mm., and with it I am enabled to make extremely narrow linear cauterizations. Each tip is supported by three platinum wires, which are fastened to a metallic collar which screws on the handle. Through the handle (24 cm. long) a stream of mingled air and benzine vapor is forced by means of a hand-bag and balloon. The balloon serves to make the current of air steady and continuous. From the balloon the air passes into a hard rubber ball containing wool in which a little benzine has been poured. The whole instrument with a small bottle for benzine has been packed for me by Messrs. Tiemann, in a box 26 cm. long, 8 cm. wide, and 6 cm. high.

The Paquelin cautery is managed as follows: After introducing about half a teaspoonful of benzine into the reservoir, screwing on one of the tips, air is pumped through the instrument while its platinum end is held in a flame—gas, candle, alcohol, or coal-fire. The mingled air and benzine ignite, and are projected as a flaming stream against the platinum tip; and when this has become heated to a certain degree, a white heat is easily maintained after the removal of the instrument from the gas flame or fire. This increased combustion of benzine against heated platinum is very remarkable; the process can be kept up for a long time if benzine be added to the reservoir from time to time. I should add that the refined benzine sold in drug stores for cleansing clothing is too volatile to heat well; the commonest benzine is the best. In the last few months I have employed this instrument altogether in my private practice, though still employing the Brown-Séguin cautery, and Putnam's gas cautery in my clinic. It is at once evident that the Paquelin cautery is superior to all others in its being available anywhere, in town or country, providing the operator be supplied with benzine, and a flame or strong fire to start the combustion. Its cost is great, but probably before long a simple form of cautery, with one tip, may be supplied for less than twenty-five dollars.

There is yet a fourth form of cauterizing instrument employed, viz., the galvano-cautery. I have not employed it, but recognize in it one advantage; it is noiseless. The gas and benzine blow-pipe cauterics make a hissing sound, which greatly alarms many patients. Obvious objections to the galvano-cautery are its cost, and the difficulty of carrying the whole apparatus to the homes of patients.

In conclusion I would say that any of the above cauterics will suffice for medical purposes; they all satisfy the requirements (*vide p. 170*) laid down by Brown-Séguin; they are

susceptible of being heated to a white heat, and being made of platinum, they remain smooth in spite of long usage. The choice of an instrument must be made chiefly upon the non-essential grounds of convenience and fancy. A glass rod heated in a spirit lamp has been proposed as a handy substitute for a cautery. It is a very inferior instrument, chiefly because it cannot be made very hot, because it bends and becomes unmanageable when hot, and because it cools very rapidly.

I now pass to a brief statement of the methods of applications.

Usually I follow the procedure called "*cautérisation trans-curren-te*," by Jobert and Nota, and adopted by Brown-Séquard, viz., I make very light parallel strokes with the cautery at white heat over the part chosen as the seat of counter-irritation. I aim to affect only the cuticle, and try to avoid subsequent suppuration. From four to twelve strokes can be made in an incredibly short space of time, and with very little suffering. The patient should be carefully placed with reference to the light and the comfort of the operator, and in many cases it is well to tell the patient to hold a handkerchief over his eyes. One error to be avoided is striking hard at the beginning of the strokes, since that is certain to cause blistering and suppuration. Of course the best skill is baffled by sudden movements of the patient. The strokes should not cross one another, since at the point of crossing too much effect would be obtained.

The only dressing required for a successful burning is a thin piece of old muslin or linen, which is to be pinned or sewed to the patient's underclothing. Burns behind the ear, or the upper cervical region, and on the face, require no cloth. In case of suppuration, simple cerate, carbolized cerate, or vaseline may be applied twice a day.

It is often desirable to repeat the cauterization frequently. In spinal affections, for example, we may begin at the top, and by means of daily or tri-weekly applications, cauterize the entire spinal region systematically and repeatedly.

With reference to the pain of the operation, patients differ greatly in their account of the sensations produced. The majority of my patients have considered the pain slight, and speak of its disappearance in twenty minutes or an hour. A few patients claim they suffer very much, and an equally small number declare that it is not at all painful, less painful than dry cupping. It seems quite clear to me that in most persons less pain is produced by the cautery than by a blister. Dr. Hammond recommends freezing the skin previous to applying the cautery, but this seems to me highly unphysiological. I cannot here enter into a consideration of the *modus agendi* of counter-irritation, but can simply state that the modern doctrine of superficial counter-irritation involves *irritating* the terminal nervous twigs and organs, and obtaining distant reflex vascular and nervous effects. Now, impairing or abolishing the irritability of the nerves of a region we are about to cauterize, seems hardly logical. It might be defensible for the older deep application, which was believed to relieve by the subsequent supuration. I certainly advise cauterizing the active sensitive skin.

The immediate result of the burning is a brownish welt with some roughness, due to shrivelled epidermis. Very soon a zone of hyperæmia appears around the streak, and lasts for a long time: hours in some cases. When several parallel strokes have been made close together upon a part, an enormous cutaneous hyperæmia results. This increased circulation is probably a part of various vascular movements produced by the application, and necessary to its

efficacy. Later results are a dry, brown scab, which falls off in a few days, leaving a red or reddish-brown scar, which disappears surely but slowly in almost every patient.

The popular dread of the cautery is great, chiefly because of certain absurd accounts of the burning of patients which have appeared in the secular journals, and partly because the terms used—"burning," "cautery,"—are alarming to all but most placid minds. Yet I do not think that it is right to cauterize patients by surprise, without a warning and explanation. I always tell my patients what I mean to do, how I mean to do it, and what the usual estimate of pain is. It is very seldom that I meet with a refusal to allow a first application, and after this trial no objections or complaints are heard as a rule. I have applied the various forms of cautery to persons of all ages from eleven to above sixty years, to both sexes, to persons of extremely nervous temperament, and in most various pathological conditions, and my experience has been so satisfactory that I now use the method more than ever, and consider it a more valuable mode of counter-irritation than any other.

This account of the actual cautery has become so extended that I cannot do more than enumerate the diseases in which I have employed it, or known it to be employed with success. Cases illustrating these statements will appear from time to time in the *ARCHIVES*; and in this number Dr. Kinnicutt relates an instance of astonishing success in neuritis. Superficial cauterization by the actual platinum cautery has been satisfactorily used in the following conditions:

1. Neuralgias, acute and chronic, of the trigeminus, and of peripheral nerves.
2. Spinal irritation, and the various cerebral paræsthesiæ (pressure, numbness, etc.,) whose pathology is now obscure.
3. Spinal congestion.

4. Various forms of myelitis, acute and sub-acute.
5. Epilepsy (not by myself).
6. Intercostal pain.
7. Lumbago, acute and chronic.
8. Articular inflammation. (White swelling of knee, by Dr. McBride ; traumatic arthritis of wrist, by myself.)
9. Peri-arthritis (chronic rheumatism ?), especially of the shoulder.

In general terms the cautery is a potent and harmless substitute for blisters and pustulating ointments, in the various affections where counter-irritation is called for.

I trust that I will not be misunderstood as holding the actual cautery to be a panacea, and as urging its indiscriminate use. It is a remedy which, like all others, is to be employed only when indicated. The promiscuous burning of patients who present themselves with obscure nervous symptoms, or who are hypochondriacal, I unhesitatingly condemn.

TWO CASES OF NEURAL DISEASE.

SUCCESSFUL TREATMENT BY THE ACTUAL CAUTERY.

By F. P. KINNICUTT, M. D.,

OF NEW YORK.

THE following cases of neural disease illustrate so well certain points in the symptomatology and treatment of neural disease as to seem worthy of being placed on record :

A. N., æt. 50. The patient was in her usual good health up to the date of her present illness. For three days previous to the occurrence of the symptoms about to be described, she "felt out of sorts;" there was anorexia, chilliness and general malaise. On the third day she was seized with acute pain in the region of the left shoulder, running down the outer aspect of the arm and forearm into the thumb and forefinger; there was also much pain in the same side of the neck and head, running up as far as the vertex. The pain was of a continuous character with exacerbations. On the evening of the third day after the occurrence of the pain, an eruption occurred about the shoulder, extending down the outer surface of the arm and forearm and along the dorsal surface of the thumb. With the appearance of the eruption, the pain became much less severe, and in the course of the subsequent twenty-four hours entirely disappeared, a good deal of stiffness, soreness and inability to use the arm and hand alone being complained of. The eruption is described as having consisted of minute blisters (vesicles), some of which dried up, others rupturing with the escape of a clear fluid. The patient was first seen by me three weeks after the occurrence of the above symptoms, when the following notes were taken : On the upper portion of the left scapular region, just

below the spine, are three groups of small superficial ulcers, a similar group is observed just below the shoulder-joint, a fourth at the point of exit of the musculo-spiral nerve. Below the elbow there are numerous single similar ulcers, arranged in a vertical line, corresponding very perfectly to the course of the radial nerve, extending the entire length of the forearm and along the dorsal surface of the hand and thumb as far as the nail. The distal half of the thumb nail is shrivelled and cracked, and shows evidence of becoming detached. The color of the skin of the hand and thumb is a purplish red. A decided feeling of numbness in the thumb and index-finger is complained of, and as tested by the æsthesiometer there is a slight loss of sensation, as compared with the corresponding parts of the opposite side. Elsewhere sensation is normal. The grasp of the left hand is very weak; the dynamometer registers 6 and 20 kilos for the right and left hands respectively.

The left arm and forearm measure respectively three-quarters and a quarter of an inch less than those of the right side. There is a comparative loss of reaction to the faradic current in the affected muscles. The patient complains in addition to the numbness in the thumb and forefinger, of stiffness of the elbow and shoulder-joints. There is slight tenderness on firm pressure along the course of the radial nerve.

In view of the evidence of a spontaneous disappearance of the neuritic affection, the treatment consisted simply in the application of the induced current to the affected muscles and on January 2d, six weeks after treatment was instituted, the following note was made: There is no numbness or other abnormal sensation in the affected parts; there is no tenderness on pressure along the course of the nerve. The forearms are of the same size, by measurement, the left upper arm measures a-quarter of an inch only, less than the right. The dynamometer registers a difference of only 4 kilos between the right and left hands. The reaction to the faradic current is normal.

O. D., æt. 14. The patient was first seen by me Dec. 7th, 1878. Six years ago, while in good health, after holding a large piece of ice "as much as he could lift" in the left hand for about ten

minutes, the patient was suddenly seized with acute pain in the same hand, running up the arm as far as the elbow, followed by "drop-wrist," wasting of the muscles, and apparently by trophic disturbances in the parts supplied by the radial nerve. Recovery in six months. There has been no further trouble until six weeks ago, when suddenly, without ascertainable cause, acute pain was felt along the entire course of the radial nerve of the same arm. The pain was of a continuous character, with exacerbations, chiefly nocturnal, and became almost unbearable on the slightest movement of the affected parts.

Examination. There is marked paresis of the extensor muscles of the left hand and fingers ("drop-wrist"), with acute spontaneous pain extending as high as the elbow, becoming intense on the slightest movement; it is of a continuous character, with exacerbations. There is hyperalgesia of the affected hand and forearm, with exquisite tenderness on pressure along the whole course of the radial nerve. An examination to ascertain the existence of a swelling of the affected nerve is impossible. There is no difference in the size of the forearms by measurement. There is a slight comparative loss of reaction to the induced current in the affected muscles.

The application of the actual cautery along the entire length of the affected nerve was ordered, with rest, by means of proper support, for the hand and arm.

Dec. 9th. The parents of the patient and he himself state that *all spontaneous pain had disappeared at the end of three hours following the application of the cautery, and that he has been wholly free from it since.* To-day the improvement is most marked. Not only has the spontaneous pain disappeared, but pain is not excited by movement of the parts. The tenderness along the course of the nerve has greatly diminished. A second application of the cautery was made.

Dec. 15th. There has been no return of the pain, it is not excited by movement, the tenderness along the course of the nerve has disappeared, except at one point in the hand, corresponding to the first interosseous space; the patient is able to partially extend the hand and fingers.

Dec. 30th. The cautery has been applied twice since the last note, in the course of the first interosseous space, and the faradic current on two occasions to the extensor muscles, and to-day recovery is complete. There is no pain or tenderness on firm pres-

sure along the course of the radial nerve, the paresis of the extensors has wholly disappeared, the patient having perfect use of the hand and fingers.

Remarks. Case No. I is of interest, as illustrating the dependence of herpes zoster upon neuritic processes; a dependence which clinical and anatomical investigations of the past few years leave little doubt in regard to, although authorities are as yet at variance as to whether the zoster originates from an irritation of trophic nerve centres (ganglia of posterior roots,) or whether it may be due to an ultimate extension to the tissues of the skin of a descending neuritis.

The group of symptoms exhibited, viz., pain of a continuous character, occurring mainly in the course of distribution of the circumflex, musculo-spiral and radial nerves (post. cord of brachial plexus), the tenderness on pressure along the course of the radial nerve, the atrophy of the muscles supplied by these nerves, with paresis and diminished electrical (faradic) excitability, renders the diagnosis of gangliitis with a descending neuritis, chiefly affecting the posterior division of the brachial plexus, a very positive one. That a neuritis may exist without the occurrence of zoster, as in Case No. II, does not invalidate the claim of the dependence of the latter upon neuritic processes.

The pain experienced in the muscles of the same side of the neck and head, may be regarded as due to a radiation to the cervical plexus, rather than to an extension of the neuritis beyond the brachial plexus.

Case No. II is of especial interest as illustrating the remarkable results of a mode of treatment, of which little mention is made in cases of acute neuritis. Energetic antiphlogistic measures, the application of cold in the form of wet compresses or of ice, local depletion, and the control of pain by subcutaneous injections of morphine, form the

commonly accepted practice. In the present instance the employment of the most energetic counter irritation, in the form of a *single application of the actual cautery along the whole course of the affected nerve, was followed by almost immediate and complete relief from the pain.* Further applications resulted in the disappearance of the tenderness along the course of the nerve, and to a great extent of the paresis of the muscles. The only other treatment adopted, consisted in the securing of rest for the affected parts by means of proper support. The rapid recovery of muscular power with the slight wasting and loss of electrical excitability, would point to an inflammatory process limited to the nerve sheath (perineuritis), and producing its symptoms through compression of the nerve tubes. In a future number of this journal, the results of a similar mode of treatment in a series of cases of neuritis, will be published.

EDITORIAL DEPARTMENT.

THE UTILITY OF THE SPHYGMOGRAPH IN MEDICINE.

By T. A. McBRIDE, M. D.

The introduction of a new sphygmograph to the notice of the profession within the last year has awakened fresh interest as to the value of the instrument in clinical research, and I propose in this article to review what has been accomplished recently in sphygmography, and to point out what the sphygmograph does undoubtedly teach, and what is its practical value.

By most of the profession the instrument is looked upon as a toy, or as a piece of delicate and complicated machinery, which can only be operated by some specialist, whereas it is an instrument of very simple construction, which should be in every-day use, and which should be of the greatest value and assistance to the general practitioner.

There are many reasons why the sphygmograph has not come into general use heretofore. But besides the great cost of the instrument and the amount of time necessary to obtain a good trace, which was considerable, the chief reason has been the contradictory interpretations given to the pulse-traces, and the apparently widely different traces obtained in the same pathological conditions by the various observers. This, however, was not to be wondered at, since at that time the significance of the factors of the normal pulse-trace had not been determined, and the very important matter of the amount of pressure necessary to de-

velop the pulse-trace had been neglected, and observers were searching for pulse traces which should be considered as pathognomonic, or diagnostic of certain pathological conditions. Now that the significance of the elements of the pulse-trace is determined, and that the importance of measuring the amount of pressure employed to develop the pulse-trace is appreciated, and that it is realized that the pulse-trace is seldom pathognomonic or diagnostic of diseased conditions, and that the inferences of the observer must be based upon the significance of each factor of the pulse-trace, the amount of pressure employed, and the conditions under which the observation is taken, the sphygmograph is proving to be of the greatest practical value in medicine.

Three sphygmographs in particular claim the attention of the profession at present, and they bear the names of their respective inventors, Marey, Mahomed, and Pond.

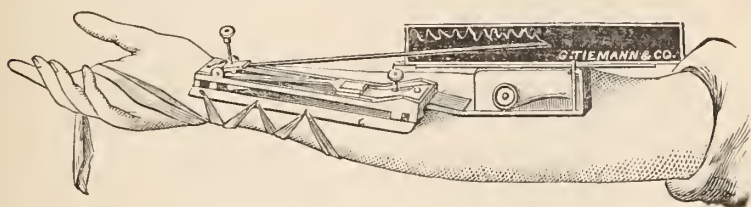


FIG. 1. MAREY'S SPHYGMOGRAPH.

Marey's instrument is represented in Fig. 1, and I shall assume that it is so well known to the profession that a minute description is unnecessary.

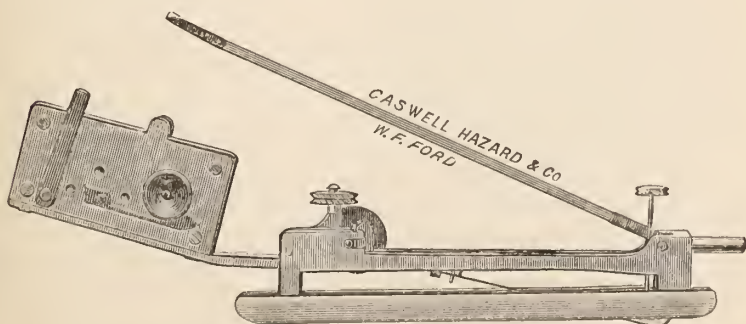


FIG. 2. MAHOMED'S SPHYGMOGRAPH.

Mahomed's sphygmograph is a modification of Marey's. This is the instrument which is preferred in Great Britain. It is represented in Fig. 2. The great advantage of this instrument is that the amount of pressure employed can be estimated quite accurately. The amount of pressure used is registered upon a dial, and the pressure is applied to the spring which rests upon the artery by means of an eccentric. It is necessary in using the Marey or Mahomed to place the forearm upon a padded splint, and the instrument is then applied to the forearm and fastened to the splint by tapes or elastic bands.

FIG. 3. POND'S SPHYGMOGRAPH.

The Pond sphygmograph, Fig. 3, is the one which has been introduced recently, and it resembles in many respects Longuet's*

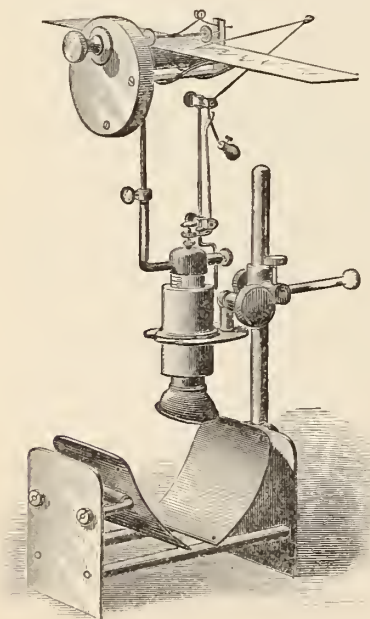


FIG. 3.

sphygmograph. It is much smaller than either the Marey or Mahomed, and costs much less. The instrument is provided with a wide oval base, which is covered by a rubber diaphragm, and it may be held by the hand over the artery, or fixed by means of a holder. The rubber diaphragm here takes the place of the spring, which is present in the other sphygmographs. The objections to the instrument as depicted in Fig 3, and as just described are as follows:

From the absence of a spring which should keep the vertical lever always in contact with the artery, it is impossible to estimate the amount of pressure employed; again the rim of the broad base exerts more or less pressure on

* Maurice Longuet, Bulletin de l'Académie de Médecine, 1868, t. XXXIII., p. 962.

the artery : and moreover you cannot be sure that the end of the vertical lever is resting exactly on the artery as long as the broad base is covered by a rubber diaphragm. To meet these objections, the inventor has made another base which is readily applied by unscrewing the broad rubber covered base and screwing on the new attachment, which consists of a vertical lever terminating in the lower end in a small metal button, which rests upon the artery, and this lever is secured to the body of the instrument, and kept in constant contact with the artery by a spiral spring, which has been carefully graduated to correspond with the scale marked on the outside of the instrument. By this improvement it is thought that all of the objections have been overcome. The instrument can be used with or without a wrist-rest. The advantages of the Pond sphygmograph as improved, are many. It is of small size, and can be carried in one's pocket conveniently ; a trace can be taken from any superficial artery of the body in a very short time, scarcely three to five minutes being occupied, which includes the preparation of paper to receive the trace, and the finding of the artery ; the facility with which it may be applied without disturbing the patient in the slightest, it may be used as a cardiograph, without any change in its arrangements being necessary. All these are certainly very great advantages, since they are just those which will lead to its more frequent use.

I now pass to the consideration of the normal pulse-trace.

FIG. 4.—A NORMAL PULSE-TRACE MAGNIFIED.

Certain parts of the trace are known by special names : *a*, *b*, as the up-stroke, or more commonly the percussion stroke or wave ; the wave *d* as the tidal wave ; *f* as the dicrotic wave ; *e*, the aortic notch, and *a*, *a* the respiratory line. A satisfactory explanation as to the causation and significance of these different parts of the pulse-trace has only been

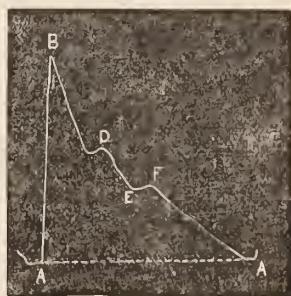


FIG. 4.

arrived at within the last few years, and it is mainly to the efforts of Galabin and Mahomed that this is due.

The following explanation as to the formation and significance of these elements of the pulse-wave is abstracted from an article on the sphygmograph, by Mahomed, in the last edition of *Gant's Surgery*.

If fluid be pumped into an elastic tube, there is a more or less sudden expansion of the walls of the tube, and then a gradual collapse, and if this be represented graphically, a wave like that in Fig. 5 appears. This is the

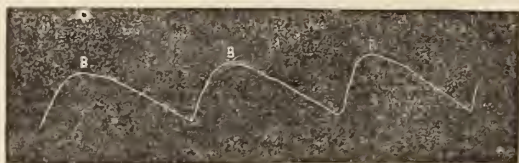


FIG. 5.

wave which forms the foundation of the pulse-trace, and is known as the "Tidal" wave. The arteries of the body contain always more or less blood, and if the force which drives more blood into the vessels be suddenly and forcibly imparted, "an element of percussion or shock will be introduced, giving an abrupt and vertical upstroke from the jerking up of the lever by the sudden expansion of the artery. Owing to its acquired velocity, this movement of the lever is rather greater than the corresponding movement in the arterial wall which produced it, and reaching its highest point, it falls suddenly of its own weight till it again is caught, and perhaps slightly raised by the tidal wave, which is now only reaching its maximum of distension." This is represented in Fig. 6, tidal wave B + percussion wave A :



FIG. 6.

The third element, the dicrotic wave, is produced by the contraction of the elastic walls of the vessel upon their fluid contents with the closed aortic valves as a *point d'appui*. The elastic

walls are over distended during systole, and with the cessation of the ventricular contraction, by reason of their elasticity, they spring back, and closing the aortic valves, thus impel forward a new wave—the “dicrotic.” The pulse-trace is thus made up as in Fig. 7 of the tidal wave B + percussion wave A + dicrotic wave C.

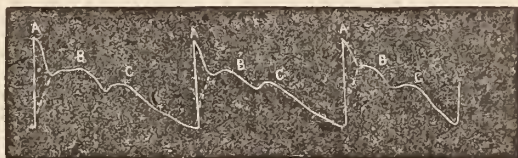


FIG. 7.

“Various degrees of dicrotism occur, to which terms have been applied indicating the relation of what is known as the aortic notch to the respiratory line of the tracing. The aortic notch, sometimes called the dicrotic notch, is the notch immediately preceding the dicrotic wave. It is so-called because it is co-incident with the closure of the aortic valves, and indicates the termination of systole; the portion of the pulse-wave preceding it coincides with the systole, that following it with diastole.” The respiratory line is the line drawn through the lowest point of the up-strokes. This should be straight in a normal tracing, but if the blood tension is disturbed by abnormal action of the respiratory apparatus, the line will become undulating. If a deep inspiration be taken, the blood is drawn into the thorax, and blood pressure is correspondingly lower, and the respiratory line sinks; if a strong expiration be made, the blood tension is increased, and the respiratory line ascends. Now to return to the degrees of dicrotism. If the dicrotic wave is prominent, and the aortic notch approaches the respiratory line, the trace is simply “dicrotic;” when the aortic notch is on a level with the respiratory line, the trace is “fully dicrotic,” and when the aortic notch is below the line, the trace is “hyperdicrotic.”

The changes which the elements of the pulse-trace may undergo will now be considered. The percussion wave is due to shock or sudden impulse, and is produced by sudden and forcible contrac-

tion of the heart. It may be very exaggerated, and form the most striking feature of the trace, or it may be transmitted much more rapidly than the tidal wave, so that the two become distinctly separated from each other, or it may be very much diminished.

The percussion wave is

Increased by	Diminished by
1. Forcible contraction of heart.	1. Feeble contraction of heart.
2. Sudden " "	2. Gradual " "
3. Large amount of blood.	3. Small amount of blood
4. Fulness of vessels.	4. Emptiness of vessels.

(Mahomed.)

The tidal wave is the true pulse-wave, and indicates the passage of a volume of blood through the arteries. The percussion wave attains its maximum intensity instantaneously, while the tidal wave does so more gradually, and hence their separation in the trace, and the interval between, is sometimes very considerable. Frequently, however, they are inseparable, the percussion wave not existing, or being merged into the tidal.

The tidal wave is

Increased by	Diminished by
1. Slow and prolonged contraction of heart.	1. Quick and short contraction of heart.
2. Large volume of blood.	2. Small volume of blood.
3. Emptiness of vessels.	3. Fulness of vessels.
4. Diminished outflow, or slow capillary circulation.	4. Increased outflow, or rapid capillary circulation.

(Mahomed.)

The dicrotic wave occurs during the diastole of the heart, and it may sometimes reach almost as high as the tidal and percussion.

The dicrotic wave is

Increased by	Diminished by
1. Sudden contraction of heart.	1. Gradual contraction of heart.
2. Emptiness of vessels.	2. Fulness of vessels.
3. Increased outflow, or rapid capillary circulation.	3. Diminished outflow, or slow capillary circulation.

- | | |
|--|---|
| 4. Elasticity of the aorta. | 4. Rigidity of the aorta. |
| 5. Relaxation of muscular coat
of arteries. | 5. Contraction of muscular coat
of arteries. |

(Mahomed.)

One of the most important uses of the sphygmograph is to point out the degrees of blood tension. The pulse-traces in low tension are easily obtained, and are sufficiently characteristic. To interpret the pulse-traces of high tension is not always so easy. Mahomed, however, gives a very simple rule, which will answer in most cases. Its application is shown in Fig. 8.

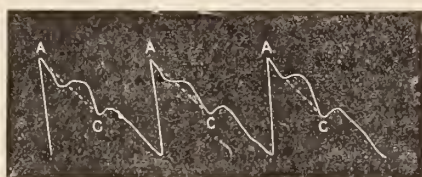


FIG. 8.

Draw a line from summit of percussion wave A to the bottom of the aortic notch C, and if any part of the tidal wave rises above this line, forming a curve with its convexity upwards, the tidal wave may be said to be unduly sustained, and the arterial tension to be high. Another rule is to measure the distance of the bottom of the aortic notch from the base or respiratory line; the greater the distance the higher the arterial tension, and *vice versa*. This is represented in Fig 9.

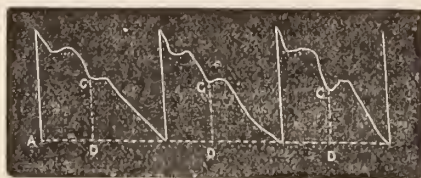


FIG. 9.

“In high tension the percussion wave is usually well-marked and separated from the tidal wave. Sometimes it is absent from failing power and feeble contraction of the heart. High tension may exist with the arteries contracted or relaxed; the up-stroke may therefore be short or high. It usually requires considerable

pressure to develop the pulse, but not invariably ; this depends upon the strength of the heart, and the force of its contractions.

“ The other extreme of tension is gauged by the dicrotic wave, the size to which it is developed, the shortness of the line, (from the aortic notch to the respiratory line) or its entire absence ; the pulse being fully dicrotic or hyperdicrotic. In addition to this, the percussion wave is generally absent, and the collapse of the tidal wave is sudden, the angle formed by the up-stroke and the down-stroke being very acute. This sudden collapse is due to the emptying of the artery being sudden and not gradual.”

It is opportune to consider at this point the subject of the amount of pressure to be applied to the artery. In taking a trace with the sphygmograph, the rule is to use that amount of pressure which is necessary to develop the most distinctly marked trace. In health with Mahomed's instrument three ounces is the average amount of pressure necessary ; with the improved instrument of Pond, I am as yet unable to say how much will usually be required. It is mainly to neglect in appreciating the amount of pressure employed and required, that are due the widely different traces obtained where the same pathological conditions have been present, and we can readily understand how traces apparently the same in all appearances, may have quite a different significance if developed under very great pressure or under very slight. A knowledge then of the amount of pressure employed is valuable for a number of reasons :

a. It measures the strength of the heart contractions, and reveals hypertrophy from its inception, and shows the beginning of heart failure and its course.

b. It indicates the degree of high or low blood tension.

c. It enables one to determine the change from day to day in arterial tension, and in what direction the change has taken place.

d. It assists in differentiating the pulse-traces of *endarteritis* and those of high tension.

Having now considered briefly the various sphygmographs and the significance of the several elements of the pulse-trace, and the subject of pressure, I shall endeavor to show the practical value of

the sphygmograph in medicine, and to point out some of its positive teachings.

1. It will count the pulse, inscribing each pulsation upon the prepared slide. It is very difficult to be certain as to the frequency of the pulse when it is above 140. The greatest frequency that I have had an opportunity to use the sphygmograph to record was 165 to the minute, and I feel sure from the appearance of the trace, that it could inscribe even greater frequency than this.

2. In certain diseases, notably acute hydrocephalus, certain irregularities of the pulse-beat are observed, and these have often a certain rhythmical character, which it is sometimes impossible to appreciate by touch. The sphygmograph, however, inscribes the beats in legible characters. This is important, since, according to B. W. Richardson, it is invariably a fatal sign.*

3. It determines high or low arterial tension, and to some extent the degree of such conditions, and is consequently very valuable in the following pathological states :

In the diagnosis of the different forms of Bright's disease and especially the small kidney. It is also of assistance in such cases by forecasting an attack of uræmic coma or convulsions by an increase in the arterial tension.†

In Scarlatina it reveals increased arterial tension, which is soon followed by the appearance of hæmoglobin in the urine, which can be readily recognized by appropriate tests, and later by albuminia. If, however, the high blood tension be relieved by purging, etc., such a result may be prevented.‡

In the last months of pregnancy by showing an increase in the high arterial tension which is normally present, convulsions may be anticipated; and a condition of increased blood pressure after confinement as indicated by the sphygmograph, would have the same significance.§

* On Intermittent Pulse and Palpitation, in Discourses on Practical Medicine, London, 1871.

† Galabin, Thesis for the degree of M. D. Cantab, 1873. Mahomed, On chronic Bright's disease and its essential symptoms, *Lancet*, January 11th, 1879, et seq.

‡ Mahomed, Medico-Chirurgical Transactions, Vol. LVII, p. 197, 1874.

§ Mahomed, *ibid.*

In the early stages of general paralysis, the demonstration of a degree of high tension is sometimes of great assistance in diagnosis.*

In the diagnosis of true and pseudo-angina pectoris, a pulse of high tension being present in the former. It may be mentioned that sphygmographic observation first led to the discovery of the true pathological condition in angina pectoris, and suggested nitrite of amyl as the remedy.†

In the so-called "apoplectic constitution," the recognition of the degree of high tension is very important in prognosis and treatment.‡

The recognition of the degree of low tension in anæmia, chlorosis, dementia, melancholia, hysteria, and many other affections characterized by great debility, is extremely important in the regulation of treatment.§

4. In acute diseases and at the bedside, sphygmographic observations are of the very greatest value. Anstie in "Lectures on the Prognosis and Treatment of Certain Acute Diseases with Special Reference to the indications afforded by the Graphic Study of the Pulse." The *Lancet*, (July 13th, 1867,) states: "Any case, (speaking of pyrexial conditions) in which the hyperdicrotous form occurs, must be considered a grave one, more especially if this form be attained early and maintained with constancy during several days, or particularly if it be maintained beyond the period when defervescence might be expected to take place; for instance, if by the twenty-fourth or twenty-fifth day of typhoid fever, the pulse has not receded to a milder form of dicrotism, the probability is great, that some serious complication such as pneumonia or the like is about to take place," (p. 36).

Again, "In all cases the maintenance of the high moderately sharp apex, save at the period when defervescence might be expected, is *pro tanto* of good augury; and in all cases the appearance of the blunt apex, with a small maximum height of the curve while the pulse is rapid, and the aortic notch deep, is extremely ill-

* George Thompson, West Riding Reports, Vol. I, p. 70.

† Gairdner, Reynolds System of Medicine, Vol. IV, p. 572.

‡ Broadbent, Fothergill, Gowers, and Charcot.

§ Broadbent, and Fothergill.

omened, and every hour during which it persists adds to the gloominess of the prospect," (p. 64).

"Irregularity of the pulse waves, particularly of the systolic portion in the height of the pyrexia, is a bad sign."

"Irregular undulation must not be confounded with regular undulation. *Any variation* of the general line of tracing, indicates that the maximum and minimum of the arterial pressure are shifting. But when the undulation consists of a series of regularly arched curves of equal size, each including from four to five pulse waves, it may be concluded that the undulation is due to the respiratory movements, and in fact, it is in bronchitis that this effect is chiefly noted. This appearance will often announce the approach of bronchitis in the midst of typhoid fever."

"* * * * * the appearance of the irregular undulating trace, especially if the size of the waves be small and their apices bluntly rounded, is probably of an absolutely fatal significance."

"When in an advanced stage of an acute pyrexial disease, the pulse having been previously hyperdicrotous, there occurs a pulse-curve of small size, with a moderately sharp apex, and devoid of any secondary markings, a perfectly smooth monocrotous curve in fact, and with the line of descent somewhat concave downwards, such a pulse is of very bad omen and recovery is next to impossible." (pp. 123 and 124).

5. In diseases of the heart the sphygmograph assists in diagnosis only to a limited extent. The traces obtained in aortic stenosis and aortic regurgitation (Galabin,* Foster,† and Mahomed ‡) are more or less characteristic, when either is singly present. The sphygmograph is of value however, in determining the extent or amount of valvular disease present. It likewise informs us of beginning failure of a hypertrophied heart, and is of great assistance in regulating treatment.§

Consult also Fothergill and Broadbent. ||

* Medico-Chirurg. Transactions, Vol. LIX. 1876.

† Clinical Medicine, 1874.

‡ Med. Times and Gazette, Vol. I, 1872, et seq.

§ Handfield Jones, Lancet, Vol. II, 1877.

|| Fothergill, Secondary Affections of Heart, Lancet, 1877, and Broadbent, Lancet, Vol. II, 1875.

6. In endarteritis deformans the trace is very characteristic, and long before there is any appreciable change in the peripheral vessels to touch, the peculiar trace is given by the sphygmograph.

7. In the diagnosis of thoracic aneurism it is of great assistance. At a meeting of the Clinical Society of London, reported in the *British Medical Journal*, February 17th, 1877, Dr. Mahomed stated that he believed that more valuable information could generally be obtained regarding the situation of thoracic aneurism from the sphygmograph alone, than from a combination of all other physical signs, and he related three cases where the diagnosis had been confirmed by autopsies. The signs of aneurism in sphygmographic tracings as given by Mahomed are :

“ 1. Diminution in the volume of the pulse wave.

2. A sloping up-stroke.

3. Impairment or annihilation of the percussion element.

4. Partial or complete obliteration of the dicrotic or other secondary waves.

5. General diminution, but sometimes increase of the amount of pressure required to develop the tracing.”

“ If all or some of these characters were found in the pulse on the right side and not on the left, the aneurism was of the innominate ; if in the right and partly in the left side, it was of the innominate and transverse arch ; if in the left only, it was of the transverse arch, or root of the subclavian ; if the signs were only partially present and equal on both sides, it was an aneurism of the ascending arch ; if all were strongly marked, and only on one side, it was probably directly in the course of the subclavian artery, and would not be found involving the aorta.”

In conclusion, I would say that the practical applications of the sphygmograph are by no means limited to the pathological conditions which I have enumerated in this review, and I feel persuaded that its utility will be recognized more and more if observations be made with proper care. For this end, there are certain rules which every observer should keep always in mind : to take into consideration every element of the pulse-trace, to appreciate the amount of pressure employed, to always take several traces at

different degrees of pressure, and to take into account all of the conditions under which the traces have been taken. The traces taken in this way will then fill their proper part in the induction which furnishes the diagnosis, prognosis or indications for therapeusis, and sphygmographic observations, will receive the attention and consideration which they deserve.

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20. Galabin. On the Causation of the Water Hammer Pulse, and its Transformation in Different Arteries as Illustrated by the Graphic Method. *Medico-Chirurgical Trans.*, Vol. LIX, 1876.

21. Reynold's System of Medicine, Vol. IV, 1877. W. T. Gairdner, on Angina Pectoris; C. Hilton Fagge, Disease of the Valves of the Heart; W. R. Gowers, Hypertrophy of the Heart.

22. R. Douglass Powell. Aneurism of the Thoracic Aorta. Reynold's System of Medicine, Vol. V, 1879.

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NEW BOOKS AND INSTRUMENTS.

Clinique Medicale de l'Hopital de la Charite de M. A. Vulpian. Considerations cliniques et observations par le Dr. F. Raymond, pp. 942. Octave Doin, Paris, 1879.

This book is a veritable thesaurus of interesting clinical studies. It contains the histories of one hundred and sixty-eight cases in the service of M. Vulpian, which have been carefully reported and collected by Dr. F. Raymond. These cases are those of special interest which were under observation in the first seven months of 1877, while Dr. Raymond was interne. The cases are arranged under appropriate headings, and each group is preceded by some general remarks in which attention is drawn to points of special interest and to the remarks of M. Vulpian on such cases. Chapters are given to rheumatism, affections of the skin, heart, arteries and aorta, digestive apparatus, liver, respiratory and genito-urinary apparatus, fevers, anæmia, chlorosis, leucocythæmia, diabetes mellitus, alcoholism, saturnism, and nervous system. A mention of the contents of the first chapter on rheumatism will give some idea as to the value of the work :

Observation 1st.—Acute articular rheumatism developed *à propos* of a blennorrhagia, with acute endocarditis as a complication.

Obs. 2d.—Sub-acute articular rheumatism, with scarlatinaform eruption, afterwards chronic urticaria ; also rheumatic retinitis

Obs. 3d.—Scarlatinaform eruption in patient of rheumatic antecedents.

Obs. 4th.—Lunibago ; erythema papulatum ; rheumatic angina.

Obs. 5th.—Acute articular rheumatism ; rheumatic cystitis ; local syncope of the extremities ; erythema papulatum.

Obs. 6th.—Acute articular rheumatism, anæsthesia over affected synovial sheaths.

Obs. 7th.—Acute articular rheumatism ; rheumatic œdema.

Obs. 8th, 9th and 10th.—Acute and sub-acute articular rheumatism, with transitory albuminuria.

Obs. 11th, 12th and 13th.—Acute and sub-acute articular rheumatism treated by salicylate of soda.

Obs. 14th.—Chronic articular rheumatism, with sub-acute exacerbations and rheumatic inflammation of the thyroid gland.

Obs. 15th.—Symmetrical rheumatic retraction of palmar aponeuroses ; Mitral stenosis.

Obs. 16th.—Chronic rheumatic arthritis deformans of adolescence.

Obs. 17th.—Traumatic hyarthrosis of left knee. No atrophy of muscles.

Obs. 18th and 19th.—Chronic articular rheumatism, treated by salicylate of soda.

Obs. 20.—Blennorrhagic rheumatism ; chronic arthritis of right knee ; cure by cauterization with Paquelin's thermo-cautery.

Obs. 21.—Blennorrhagic rheumatism ; successive blennorrhagia with consecutive attacks of rheumatism.

Obs. 22.—Muscular rheumatism of walls of abdomen ; grave constitutional symptoms.

Obs. 23.—Rheumatic sciatica ; no muscular atrophy ; slight albuminuria.

Obs. 24.—Rheumatic sciatica ; absence of anæsthesia.

Almost every one of the above cases has some point of special interest, and what is true of this chapter, is true of every one in the book. And as would naturally be expected, the chapters on diseases of the nervous system are especially rich in good cases. Unfortunately our limits do not permit of a more extended notice.

[McB.]

Clinical Lectures on Diseases of Bone. By C. MACNAMARA, Fellow. Cal. Univ. ; Surgeon to Westminster Hospital ; Surgeon H. M. E. Indian Medical Service ; also of the Royal Ophthalmic Hospital, London : Macmillan & Co. 1878.

In the preface to the present series of lectures the usual commonplace apologies do not occur, but we find the following : "Some of these lectures have appeared in the *Lancet*, others in the *Indian Medical Gazette* ; the remainder are now published for the first time. *All have been subjected to correction and revision.*" [Italics mine.]

One feels on reading this that the author has at least made an effort to furnish thoughts well matured and pleasingly elaborated. The need for a full and complete treatise on diseases of bone all will recognize, yet the present is not as complete as one could wish. However, accepted as a contribution to an obscure subject, it must hold a valuable place in our literature.

LECTURE I is devoted to the development of bone, and has for the surgeon a practical interest. When he has demonstrated that the blood supply in the extremity of the long bones comes chiefly from the vessels perforating the periosteum, and not from the nutrient artery, it follows that inflammatory changes are influenced by virtue of this anatomical arrangement if well regulated and continuously applied pressure is employed. The illustrations from pathological specimens serve to show how in articular osteitis the subcartilaginous layers of bones retard ankylosis in the joint.

It is well observed that in the joint diseases of adults, success depends on *free drainage* and *removal of the articular surfaces* of the bones involved, while among children before ossification of the epiphysis takes place, and while as yet no subcartilaginous layer of bone has been formed, joints may be preserved by *free drainage alone*, and by keeping the ends of the cartilage at rest in accurate and continued apposition.

A thorough appreciation of this fact by the surgeon would save many joints in children, and the amputation of a foot or a leg for chronic articular osteitis would be an operation rarely performed.

LECTURE II embraces acute and chronic osteo-myelitis, acute periostitis and epiphysitis. The point of interest regarding osteo-myelitis is the question of amputation—when should this be performed—or should it be performed at all? The lecturer draws attention to this very forcibly, and a very instructive case in point is given in detail. In fact the clinical records occupy a prominent place throughout the entire book, and the details are such that many practical suggestions occur to the reader. In this country at least the failure of excision of the hip-joint to cure disease seems unquestionably due to the non-removal of bone affected with osteo-myelitis. Some surgeons have gone so far as to say that when they perform excision of this joint, the consent of parties interested must first be had to amputate at the hip, should this grave central lesion exist. The author seems not to lay enough stress on the importance of trephining bone for the relief of abscess. Too long delay always involves the risk of destroying the joint,

and should the diagnosis be not always clear, an exploratory incision would, at least, be justifiable. His remarks on acute periostitis accord well with sound doctrine. One cannot help but admire the pathological study to which the specimens are subjected, and the care taken to bring out every point of interest. It is very properly remarked that the study of pathology is apt to mislead us unless we examine specimens of the structures implicated immediately after death, and alter their condition as little as possible by reagents.

Two very instructive cases of *epiphysitis* in children are given in detail, and I would like to transcribe one in this review did space permit

In LECTURE II, while discussing hypertrophy, a practical point is illustrated by a portion of the distal end of a femur, excised for disease of the joint; here then, is an excess of osseous tissue over that of a corresponding point of the fellow limb. The lesson thus taught is that under such circumstances, division of tendons and the breaking down of ligaments for the relief of deformity fails, because of hypertrophy anteriorly to the condyles preventing apposition. If such deformity is to be relieved at all, excision offers the only hope.

The differential diagnosis of the acute form of condensing ostitis, or diffuse sclerosis of bone, from suppurative periostitis, he regards as extremely difficult, and knows of no way of making such diagnosis without cutting down upon the bone. The importance of being correct here is best shown by the following: " * * * so far as I can judge, in acute periostitis the periosteum is speedily destroyed, and the bone having been laid bare becomes rough and necrosed. In sclerosis this is not necessarily the case, as, in instances I have related, on examining the diseased bone, we found its surfaces smooth and encased in comparatively healthy periosteum, * * * in diffuse sclerosis our aim should be to preserve the periosteum, expecting to get bone reproduced in place of that which we may remove, but in suppurative periostitis we can seldom hope for a result of this kind, and amputation of the diseased limb or the entire removal of the affected bone may alone suffice to save the patient's life."

LECTURE IV, on tuberculous affections of bone is based upon fact, and is certainly valuable as a contribution to this much vexed question. His studies both macroscopic and microscopic coupled with a close observation of the clinical histories with which he seems so fertile, lead him to believe in constitutional defect as a

cause of the majority of these affections, especially in the neighborhood of joints, and he very properly regards "absolute rest" as a misused adjunct in the treatment of the same.

As illustrative of his argument for a constitutional cause, as predisposing while traumatism may act as the exciting, he speaks as follows of a patient in whose father or mother no trace of hereditary disease could be detected :

"In the case we are investigating, it is quite possible that the law of *interrupted transmission* may have affected the issue, for although we could discover no history of constitution disease in the lad's family, his ancestry may have acquired a fault by means of which, structures entering into the formation of their body had become predisposed to the rapid overgrowth of certain elements, and it only wanted in the case of this child an injury such as he received, to upset the balance of the nutrition changes going on in the bone, to bring out prominently the defect in the organization of the medullary tissue." [Italics my own.]

For the benefit of those who may think the above a fanciful theory, I need only state that a microscopic examination detected "granulation cells," and unmistakable evidence of "tubercle which had undergone calcification in its centre."

As to treatment of tuberculous diseases of bone, to the consideration of which Lecture VI is devoted, *Exercise, air, and light*, are his great remedies, and he believes in the curability of tubercle in its early stages. Cases are cited, as is his custom, in support of his theories. The diagnosis however, is not always fully established, *i. e.*, from points given in the histories one can easily see how a different diagnosis could have been made.

He believes that leather strapping accurately applied about the parts is useful, in that pressure seems to prevent the soft parts about the bone from becoming indurated and unhealthy.

The following paragraph is so pertinent that I offer no apology for its insertion :

"If there is clear evidence that the ends of one or more bones entering into the construction of a joint are affected with tuberculous inflammation, the disease having passed into the stage of disintegration of the tissues, the joint also being affected, what are we to do then? There are some surgeons who believe that scrofulous affections of the bone never get well; and under circumstances such as I have described, they would advise amputation or excision of the diseased joint. But it is remarkable how much may be done by means of patience and favorable hygienic circumstances in the case of young persons."

And while he is free to excise distant joints, he expresses himself, after recording a case or two bearing directly upon the question involved: "My own experience so far is decidedly opposed to excisions of either the knee or hip-joint, as a rule, in cases of tuberculous disease, whatever the age of the patient may be."

The lecture on syphilitic diseases of bone contains some good clinical material. The statement that syphilis attacks the structures which are colored brown by nitrate of silver solutions in the methods employed for staining the tissues, makes the subject in a pathological sense intelligible.

Rickets is discussed to a limited extent in LECTURE IX, though without special interest as to etiology or pathology. There is here a lack of perspicuity, and while he seems to argue against it being a disease of the digestive organs proper, he certainly makes it out a disease of nutrition, on the faulty nature of which the osseous lesion depends.

We confess to a degree of surprise when we read, "in some cases the bones remain soft until the patient is eight or ten years of age;" and again, "I would limit any operative proceeding in rickets to those instances in which the abnormal condition of the bone is so great that the patient is unable to walk"!

He speaks so encouragingly of mechanical appliances in the relief of deformities of the legs in children at those advanced ages, that I feel sure Mr. Macnamara has had little or no experience in this kind of treatment. There is, one observes, a conspicuous absence of cases in this lecture to establish the truth of the above remarks.

The remaining lectures are devoted to mollities ossium and tumors of bone. These subjects are fairly exposed and bountifully illustrated by clinical material.

The work, taken in its entirety, is creditable; it does not pretend to be an exhaustive treatise. It would seem that the author had aimed at simplifying a very complex subject, and to anyone who reads the book carefully, the aim will seem to have been attained.

[V. P. G.]

Billroth's Surgical Pathology, translated from the fourth German edition, and revised from the eighth edition, by CHARLES E. HACKLEY, A.M., M.D., Physician to the New York Hospital, etc. D. Appleton & Co., New York, 1879.

A comparison of this with the first American edition shows an

increase in size from 664 to 759 pages. Of this increase 9 pages are in an appendix to the first 11 chapters, containing a *résumé* of the subject of inflammation, 18 pages in an additional chapter on amputations and resections, 48 pages of additions to the body of the text, and 20 pages of additions grouped for the sake of economy in an appendix in the form of 39 notes. The 68 pages of additions and notes are distributed among 37 of the 50 chapters, an indication of the extent and thoroughness of the revision.

The most important and extensive additions have reference to the pathology and pathogeny of inflammation and the more redoubtable complications of wounds. The author mentions rather incompletely and fragmentarily the theory of the influence of germs in the production of these complications, and, without much discussion of the subject, reasserts his belief that these complications may have their origin in the altered or destroyed vitality of the tissues themselves. He admits the poisonous quality of liquids containing certain forms of bacteria and vibrios, but inclines to the belief expressed a few years ago in his remarkable book on *coccobacteria septica* that this quality is due, not to the rapid multiplication in the body of these organisms, but to the association with them of a soluble septic poison. It is a natural consequence of these opinions that he should ascribe the favorable results of the Lister dressing to another cause than the absence or destruction of putrid germs, and this other cause is, for him, the combination of thorough drainage with equable compression of the parts.

The portion of the new chapter devoted to resections is utterly bald and unsatisfactory, considered from the standpoint either of general principles or of operative surgery, and is historically incorrect and one-sided. The author says the first excision of a carious head of the humerus was performed by White in 1768, while in fact White removed only the necrosed upper portion of the shaft, leaving the epiphysis in place. It is true that White thought that he had removed the head of the bone, but his error was pointed out by his contemporary Bent in 1774 (who had himself removed the head of a humerus in 1771), and again quite recently by Esmarch, who reproduced White's drawings and showed by comparison with other specimens that separation had taken place at the epiphyseal line. The only name mentioned in connection with the modern operation of excision of a joint is that of von Langenbeck to whom the author attributes the credit of having done more than any one else to develop the indications

and perfect the methods of the operation. Heine, who first proved experimentally the possibility of the reproduction of a joint, and whose specimens first suggested to von Langenbeck the idea of performing the sub-periosteal operation, and Ollier, who has done so much to establish the principles and perfect the method, are both passed over in silence ; and, finally, not a single general principle, and only a few of the details have been laid down in any but the most vague and unimpressive terms.

[L. A. S.]

The following books have been received :

A TABULAR HANDBOOK OF AUSCULTATION AND PERCUSSION FOR STUDENTS AND PHYSICIANS. By Herbert C. Clapp, A.M., M.D., Instructor in Auscultation and Percussion in the Boston University, etc. Boston. Houghton, Osgood & Co., 1879, 8vo, pp. 97.

THE PATHOLOGICAL ANATOMY OF THE EAR. By Hermann Schwartze, Professor in the University of Halle, Translated by J. Orne Green, A.M., M.D. Boston. Houghton, Osgood & Co., 1878, 8vo, pp. 174.

TREATISE ON DENTAL CARIES, EXPERIMENTAL AND THERAPEUTIC RESEARCHES. By Dr. E. Magitot, Laureate of the Institute of France, etc. Translated by Thomas H. Chandler, D.M.D., Professor of Mechanical Dentistry in the Dental School of Harvard University. Boston. Houghton, Osgood & Co., 1878, 8vo, pp. 275.

THE NATIONAL DISPENSATORY. By Alfred Stillé, M.D. LL.D. and John M. Maisch, Ph.D. Philadelphia. Henry C. Lea, 1879, 8vo, pp. 1628, and two hundred illustrations.

PRELIMINARY LECTURE COURSE ON PHYSIOLOGY. By James T. Whittaker, A.M., M.D., Professor of Physiology in the Medical College of Ohio. Cincinnati. C. R. Murray, 1879, 8vo, pp. 288.

And numerous Journals in exchange.

ABSTRACTS AND SUMMARIES.

Ready Estimate of Errors of Refraction. In the *Hospital Gazette* (January 16) Prof. Thomson, of Philadelphia, gives the substance of a paper read before the American Ophthalmological Society last Summer, upon a new method of estimating errors of refraction. The author has labored diligently and patiently to supply the profession with a test for ametropia, which is independent of the case of trial-glasses, and which may serve to confirm the results obtained in the usual way by the use of lenses, while not calling for so much intelligence on the part of the patient. A paper by the same author in the *American Journal of Medical Science*, January, 1870, shows that, according to the original experiment of Schreiner, whenever the visual axis is too long or too short, a point of light used as a test-object, will appear double to the eye of the observer when looking through two small perforations close together in an opaque screen. In a subsequent paper, read before the American Ophthalmological Society, the subject is further developed, and it is shown that, by means of two minute holes close together in a card (or brass disk), the presence or absence of ametropia may be readily determined, and by using a colored glass over one of the openings, the *kind* of ametropia shown. It appears that, if an ametropic (*i. e.*, myopic or hypermetropic) person observe a tiny flame from a distance of five metres through the perforated card (using only one eye) the flame appears double, the distance between the two images corresponding to the degree of ametropia ; and if one image be colored, by holding a colored glass before one of the holes in the card, the

colored image will be found on the *same* side with the hole covered in *myopia*, and on the *opposite* side in hypermetropia, according to the well-known law of projection. A second flame is then brought near the original one, and the patient at first sees *four* images, two for each flame; but by bringing the two flames near enough, two of the images may be made to coalesce, and now the actual distance between the two flames being measured, the ametropia may be determined, since a definite ratio exists between this distance and the amount of ametropia. Prof. Thomson has given a table by which the refractive error may be determined at a glance. There are, however, certain objections to this method, as, for instance, when an unusually small pupil does not readily allow the rays to reach the fundus through both holes at once, or if a stupid patient can not keep the disk steadily in front of the pupil.

The last paper of Prof. Thomson describes a new instrument by which the size of the circles of dispersion formed at the fundus of an ametropic eye may be measured, and since these circles vary with the degree of ametropia, he thus gives us another way of estimating the refractive error. The instrument is arranged to be attached to a gas bracket, and consists of a fixed gas jet and a movable one, the latter sliding along a graduated bar, which is hinged at the fixed jet, and the end of this bar is prolonged backwards into a pointer, which traverses a graduated arc. A normal eye, viewing these two gas jets from a distance of five metres, sees them as two clear-cut images, however close together they may be. To an ametropic eye, however, the lights will appear as diffuse circles, and by sliding the movable light along the graduated bar, the edges of the circles will be brought into contact, and the degree of ametropia may be at once read off upon the bar. By passing a colored glass in front of the eye under examination, and noting whether it first colors the side of the circle corresponding to the glass or the opposite one, it is easy to tell whether the ametropia is myopic or hypermetropic. The graduated bar is pivoted at the fixed light, and by revolving it on this pivot the lights may be placed at any angle with each other. If astigmatism exists, the round lights will appear elongated, and by revolving the bar until the elongation of both is in the same direction, we have the meridian of refraction shown by the index on the graduated arc, and the sliding of the movable light, until the circles touch, gives the ametropia in this meridian. Having found one meridian, the lights may be put at right angles to it, and the ametropia of the other meridian determined.

The advantage of such an instrument with a dull patient, or for the rapid examination of an intelligent one, must be evident. The patient has only to say whether he sees the flames sharply cut or in misty circles. If the latter, he has only to say when the edges of the circles seem to touch, and the diagnosis is made, unless there is astigmatism, which requires another question.

The results should, of course, be verified by the trial-glasses; but those who know how severely the patience of the ophthalmologist is often tried in examining "refractive cases," will thank Prof. Thomson for his ingenious instrument.

[S. B. ST. J.]

Nitro-Glycerine as a remedy for Angina Pectoris. By W. MURRELL, M. R. C. P. After reviewing the history of the study of the action of this drug, Mr. Murrell gives his own experience. He found by experiments on himself, in which he used in a dose one drop of a one per cent. alcoholic solution, that the drug produced very violent cardiac pulsations, so forcible as to shake the whole body. The pulse was increased to 100 and was fuller than normal. Perfect rest seemed to reduce the symptoms to a minimum. The symptoms resembled very much those produced by amyl nitrite, but were not so transitory. Tested with the sphygmograph, a similar effect was found to be produced on the tracings. Both drugs produced a marked state of diastole, and both accelerate the rapidity of the heart's action. They differ, however, in the time they respectively take to produce these effects. The full action of the glonoin is not observed in the tracings until six or seven minutes after the dose has been taken. In the case of amyl the effect obtained is from fifteen to twenty seconds after an inhalation, or a dose has been taken on sugar. The influence of the amyl is lost in less than a minute and a half.

After the glonoin the pulse did not resume its natural character for nearly half an hour. It was found also incidentally that the glonoin increased to an extreme degree the secretion of urine. Judging from the similarity of the action of the two drugs, it was concluded that their therapeutic action might be similar. Dr. Murrell therefore tried it in three cases of undoubted angina pectoris. The first was a man 64 years of age, with very severe seizures, a typical uncomplicated case. He first took one drop of the one per cent. solution and experienced very great relief. The dose was gradually increased to a gram, but this produced "a kind of fit." The pulsations were very forcible and disagreeable, the dose was reduced to .65 gram, which he continued to take for

two months. Since then, for a period of eight months, he has taken no medicine and is perfectly well. The other two cases were not quite so marked, but the relief was immediate and permanent.—*The Lancet*, Nos. 3, 4, 5, 7, 1879.

[McB.]

Autopsies in two cases presenting the symptoms of spastic paralysis. R. SCHULTZ.

Two of these cases had been published by the author as examples of spastic paralysis in the *Archiv der Heilkunde*, Bd. XVIII. In case I, a glioma was found imbedded in the medulla oblongata, and there was a regular descending degeneration of the postero-lateral columns throughout the cord. In case II, before death symptoms of lesion at the base of the brain and choked disk appeared, leading to the new diagnosis of tumor at the base of the brain and descending secondary degeneration. Autopsy revealed a tumor compressing the right processus cerebelli ad pontem, and the side of the pons; no secondary changes in the postero-lateral columns. Case III is reported as a case of spastic paralysis, but the walk is described as performed with legs wide apart (*weitbeinig*), a character not at all belonging to the symptom-group of tetanoid paraplegia. The post-mortem showed extreme dilatation of the lateral ventricles with thickening of their walls; no tumor; no change in the lateral columns of the cord.

The author concludes: (1) that the spastic (tetanoid) state is not pathognomonic of sclerosis or degeneration of the postero-lateral columns, and (2) that there is no such condition as primary sclerosis of the lateral columns.—*Deutsches Archiv f. klin. Medicin*, Bd. XXIII, Hft. 3, p. 343. [These autopsies lend strong support to the views expressed by me in the Editorial upon tetanoid paraplegia in No. 1 of the ARCHIVES.]

[E. C. S.]

Dysuria in Childbed. G. ENGLE. Retention of urine in the first days of the lying-in-period is generally attributed either to paralysis of the bladder or to spasm of its sphincter. Mattei tried to show that the retention was due to a bending of the urethra, by the rapid descent of the suddenly emptied and shrunken uterus.

The author has made some new observations, having studied with special reference to this point 1,325 cases. Of these cases 600 were primiparæ and 725 multiparæ. It was necessary to use the catheter in 35.3 per cent. of the primiparæ in the first few days after delivery, while the same procedure was necessary in only 8 per cent. of the multiparæ. The reason of this difference the

author thinks must be sought in some anatomical condition which is most commonly met with among the primiparæ. This condition he finds to be the lacerations so common after first labors and to these he attributes the dysuria. Every tear, even though slight, starts up an acute inflammatory process. This process extends to the urethra, irritates its spincteric fibres, and causes a condition of tonic spasm, which the muscles of the bladder are unable to overcome. When the laceration is finally converted into an ulceration the inflammation ceases and the spasm stops, after which the *detrusores vesicæ* are enabled to perform their functions.

Attention having been called to these facts, special examinations were made, and in 90 per cent. of the cases the causal relations between the dysuria and the lacerations were found to exist. In 212 cases of primiparæ the lesions were near the urethra in 28, in the bulb of the urethra in 3, and in 16 both the urethra and perineum were affected together; there were 103 ruptured perenei, and in 10 cases condylomata and syphilitic ulcerations, which showed the effects of the labor in being scratched and torn. In 22 cases only was there no laceration of tissue discoverable.

Among the multiparæ, dysuria occurred in only 54 cases, 16 of these had lesions near the urethra, 23 lacerations of the perineum, 5 condylomata or ulcerations, and in 10 could nothing be found.

The treatment adopted had for its object the reduction of the spasm. To this end pieces of ice were introduced into the vagina; or the meatus was irrigated with warm water. Another plan, which generally succeeded, was to pass thick bougies into the urethra in order to overcome the spasm by dilatation.

As regards the question whether the distended bladder had any influence on the involution of the uterus, Engel is of the opinion that it does tend towards sub involution or secondary hemorrhage. In the 278 cases of dysuria there were 52 cases where a greater or less degree of secondary hemorrhage followed. The article closes with a case of a somewhat rare affection, incontinence following labor. (*Orvosi Hetilap* 1878 [Hungarian]: *Centralblatt für Gynäkologie*, 1878, No. 25.) [M. D. M.]

Distribution of fibres in the optic chiasm. W. NICATI.

The author gives a brief statement of the conflict of opinion now existing upon this question. He attempts to solve it as follows: First, by measurements of the surfaces of sections of the optic tracts and chiasm in cats and in man, he reaches the conclusion that semi-decussation must exist in both animals, and that the distribution of fibres in the chiasm must be substantially the

same in both. Second, he successfully performed a longitudinal median section of the chiasm in six living kittens, and, contrary to Brown-Séguard and Dupuy, found that sight was not abolished in either eye. The exactness of the section was verified by autopsies. He concludes that in kittens there is semi-decussation; and as the chiasm of man resembles that of the cat (in respect to size of sections), there must also be semi-decussation in man. This conclusion is supported by clinical experiences, (lesions of one optic tract causing hemianopsia).—*Archives de Physiologie*, 1878. Nos. 5 and 6, p. 658. [E. C. S.]

Auscultation of the skin for chirurgical purposes.—Dermatophony. C. HUETER.

The author, having found that the vascular bruit of the pulp of the finger was clearly audible upon a microphone, constructed a cheap and efficient "dermatophone," by stretching a piece of gutta percha over the open end of a binaural stethoscope, (Vol-tolini's, but Camman's might do). On placing this plate over certain vascular parts, such as the finger-tips, malar eminence, eyeball, etc., a peculiar sound, varying somewhat in pitch in different parts, is heard. This sound is the normal bruit of the subcutaneous capillaries and smaller vessels. If the hand be rendered bloodless by means of an Esmarch's band, the vascular bruit can no longer be heard in the finger-tips. In acute cutaneous inflammation, (furuncle, paronychia), a louder but deeper note is heard. In a case of partial stasis of blood in the foot, caused by a too tightly applied dressing for fracture of the thigh, the toes being dusky and cool, the vascular sound was weaker and hardly perceptible; but after loosening of the bandage, and a restoration of heat to the foot, it became louder, then normal. The instrument is also applicable to the muscles and tendons—myophony and tendophony. Applied to superficial bones while they are percussed (with a hammer or whalebone), according to Lücke's method, a distinct sound is heard. The author anticipates that these applications of auscultation will prove of help in medical and surgical diagnosis.—*Centralblatt f. die medicinische Wissenschaften*, 1878, Nos. 51 and 52. [E. C. S.]

Action of drugs on the biliary secretion. DR. RUTHERFORD gives a summary of the results obtained by his experiments on the action of different drugs on the biliary secretion of the dog. A hepatic stimulant he defines as an agent which will increase markedly the biliary secretion (not simply the expulsion of bile).

The following he finds to be the most powerful agents belonging to that class : Podophyllin, aloes, colchicum, enonymin, iridin, sanguinarin, ipecacuan, colocuta, jalap, sodium phosphate, diluted hydrochloric acid, corrosive sublimate, sodium and ammonium benzoates, sodium salicylate. Those of more moderate power as hepatic stimulants are rhubarb, leptandrin, sodium and potassium sulphate, calabar bean, baptisin, phytolaccin, ammonium phosphate, hydrastin and juglandin. Those of very feeble power are croton oil, taraxacum, scammony, Rochelle salts, sodium chloride, potassium bicarbonate, and jaborandi.

The rest of the drugs experimented with had no appreciable effect on the secretion of bile, except acetate of lead, which in large doses diminished the amount of the secretion, probably by a direct action on the liver. These drugs were calomel, gamboge, castor oil, epsom salts, ammonium chloride, menispermis, morphia, hyscyamus, and pure diluted alcohol.

All the above conclusions are based on experiments performed on the dog, and have no reference to any observations made on the human subject.

The author then gives the results of his experience with two agents, iridin and enonymin, on man, and says : "as yet we have found 30 centigrams of iridin made into pill with confection of roses and taken at bed time, a certain remedy for biliousness. It produces no disagreeable sensations, and on waking in the morning the yellow tongue is found to be clean, and the headache and *malaise* gone," It is well to follow it by a glass of Püllna water in the morning. Iridin, though an agreeable remedy at the time, leaves a somewhat depressed effect ; and it probably should not be taken oftener than once a week or so.

Enonymin is a hepatic stimulant in man as it is in the dog. Twelve centigrams of it are as efficient a remedy for biliousness as iridin. If the dose be not too great it leaves no depression. It too should be followed by a glass of Püllna water or other saline aperient.

"I have been much struck with the success of enonymin in functional hepatic derangement in several persons, who had tried nearly all the commonly used cholagogues with varying and other limited success. I have no doubt that in consequence of our experiments, enonymin will come to be an universally employed hepatic stimulant."

The *mode of action* of hepatic stimulants he considers to be by direct action of their molecules upon the hepatic cells or their

nerves. One drug was found to act as a direct hepatic depressant viz: the acetate of lead. Several drugs however have an indirectly depressant action; thus when the intestinal glands are excited to secrete, there is an indirectly depressant effect on the liver, whereby the secretion of bile is lessened. This effect followed only on powerful purgation as from magnesium sulphate. Why is the action of the liver depressed? Probably either because of the drain from the portal blood of bile-forming substances, or of an excessive lowering of the blood pressure in the liver, as in the system generally, or a large dilatation of intestinal and mesentine vessels. When such an agent as magnesium sulphate is given to an individual under ordinary circumstances, it doubtless depresses the secretion of bile, not only in the manner just indicated, but also by hurrying out of the intestinal canal substances which would otherwise have been absorbed, and would have assisted in the formation of bile. And it may be that in abnormal states of the intestinal contents, various deleterious matters may be absorbed, and hamper hepatic action. Therefore, it is reasonable to suppose that a pure intestinal stimulant such as magnesium sulphate, although it does not stimulate the liver, may nevertheless, in some abnormal conditions, exercise an important influence on that organ, by removing deleterious matters from the intestinal canal, and by draining the portal system. "We conclude then that by the discovery of the depressant effect on hepatic action of purely intestinal purgatives, we have furnished the physician with a fact which will not fail to be of no little service in rational therapeutics."—*British Medical Journal*, February 8th and 15th, 1879.

[McB.]

ORIGINAL OBSERVATIONS.

A CASE OF EXTRAORDINARY HEREDITY IN EPILEPSY.

By LANDON CARTER GRAY, M. D.

A. C., age 40, American, married. At about twelve years of age patient began to have paroxysms, in which faces of demons were seen at the right side of right eye, causing a great feeling of terror. These paroxysms ensued about three times a week, frequently oftener. Patient remained in this condition until about her twenty-third year, when epileptic paroxysms of a typical form set in, sometimes in the daytime, sometimes during the night. Infrequent at first, they became gradually more frequent, until they came sometimes as often as twice or thrice weekly. About five years since they ceased to appear, except at the menstrual period, when they ensue every alternate night during some seven days. Menses have generally been regular.

Has had nine children, who, singular to say, have been alternately girls and boys, and all dying soon after birth in convulsions, or after having convulsions, with one exception. The details of this history are as follows :

First child—girl—died on fourth day ; had convulsions during life, and died in them.

Second child—boy—died at eleventh month ; had convulsions occasionally during life, and died in them.

Third—girl—died at thirteenth month ; had convulsions in summer during dentition ; had convulsions on day of death, and died soon after.

Fourth—boy—died soon after birth in convulsions. Mother had convulsions very often during this pregnancy.

Fifth—girl—died soon after birth in convulsions.

Sixth—boy—died at fifth month; had convulsions almost continuously during life.

Seventh—girl—died soon after birth in convulsions.

Eighth—boy—died a few hours after birth in coma.

Ninth—Same as of the last.

Patient also had a miscarriage at the third month. As she expressed it, "It dropped from me as I was looking out of the window."

There is absolutely no family history of any neurosis, or of any tendency to nervous affections. No history whatsoever of any specific taint could be elicited.

Bromide of potash and sodium, bromide of potash and hydrate of chloral, belladonna, oxide of zinc, woorara, were all tried faithfully in this case, the first two combinations and belladonna being pushed until their physiological effects were obtained, but none appeared to have any palliative effect, much less a curative one.

REMARKS.—The heredity of this case is extraordinary. While there is some difference of opinion among observers as to the relative frequency of transmission of epilepsy from parent to offspring, it is yet certain that such inveteracy and malignancy of transmissibility as is exemplified in this case is well nigh, if not altogether, unprecedented. It will be noticed that the effect upon the children was more and more marked as time went on. The earlier ones lived longer, had less violent and less frequent convulsions; the next four died soon after birth, or had convulsions continuously; and the last two existed only for a few hours after delivery, dying in coma. Such a fatality as this is never witnessed in epileptic guinea-pigs, which, best of all animals, transmit this malady to their young.

A CASE OF PERSISTENT DIARRHŒA, COMPLICATED WITH
PROLAPSE OF THE RECTUM, CURED BY LOCAL
APPLICATIONS OF NITRATE OF SILVER.

BY MATTHEW D. MANN, M. D.

In April, 1875, I was called by Miss A., æt. 36, to stop a somewhat severe menorrhagia. The patient gave the following history: Eighteen years before, while residing near St. Louis, she suffered from a severe attack of dysentery. Treatment had very little effect upon the disease, and it gradually became chronic, and was only cured, after more than a year, by a change of residence.

As a result of the constant straining at stool, the rectum became gradually prolapsed; the prolapse coming on with each evacuation. Since this attack she has suffered from a constant burning pain over the course of the colon, the pain always being worse just before an evacuation. She is very nervous, and suffers greatly from sleeplessness. There are two evacuations of the bowels daily, the passages being soft but formed.

After the flow was over, an examination showed the uterus to be prolapsed and retroverted, it having evidently been pulled down by the rectum. The uterus was easily replaced, and held in position by an Albert Smith pessary. One application of the blunt curette cured the menorrhagia, and the menses have been regular ever since.

The patient was able to force down the bowel to an enormous extent. No measurements were taken, but so large was the mass that it nearly filled an ordinary chamber vessel, actually touching the bottom of the vessel when the patient sat upon it. Dr. T. G. Thomas was kind enough to see the case in consultation, and declared it to be the largest prolapsed rectum he had ever seen in a woman. He advised that the patient should always use a bed pan, and never allow an evacuation to take place when in an upright position or sitting. In this way he hoped that she would gain great relief from the discomfort attending the falling of the bowel. Operative procedures were also discussed, but the patient would not listen to any proposition of the kind.

This plan was faithfully carried out by the patient, notwithstanding the annoyance it caused her, as the relief thus afforded was very great.

She continued in much the same condition until June, 1876, when she had a severe attack of diarrhœa. When I saw her, she was having from six to ten and more large fluid evacuations a day, yellowish in color, and very offensive in odor. There was no blood or mucus, but very considerable pain. As the patient was unable to take opium in any form, the smallest dose making her nearly maniacal, I was forced to rely upon astringents; bismuth, pepsin, oxide of zinc, etc. None of these did any good; the diarrhœa persisted, and even grew worse. The patient was becoming very much reduced, and was very urgent for relief.

An examination of the rectum at this time showed it to be greatly congested, very tender to the touch, the redness and tenderness extending as far up as the parts could be reached.

As a last resort, I determined to try local treatment, hoping

thus to reduce the sensibility and irritability of the lower bowel, and thus indirectly to stop the diarrhœa; my theory being that the diarrhœa was due to increased peristalsis, which was reflex, and had its origin in the irritable state of the lower bowel.

Accordingly, with the help of Dr. P. F. Mundé, I introduced a Sims speculum into the anus, and then with a sponge on a long sponge-holder thoroughly swabbed out the rectum, as far as I could reach, with a solution of nitrate of silver of the strength of 1 to 12. Immediately following the operation, the patient complained of excruciating pain, which she referred to the transverse colon, and considerable tenesmus. The only way she could be quieted was by chloroform inhalations, which were kept up for more than an hour. After this the pain gradually subsided, and under the influence of a few drops of chlorodyne the patient was able to sleep.

After this operation the diarrhœa was considerably better, but in the course of a week came on again to such a degree that I determined on another operation. This time the patient was chloroformed at her own request, and a catheter, having a soft sponge attached to the end, so as to cover the eye, was introduced for about 20 centimeters, then about 15 grams of a solution of the same strength as before was slowly injected, the speculum withdrawn, and the sponge thus saturated was slowly drawn towards the anus and removed. The chloroform was kept up for a while, but the patient did not suffer as much as before, and passed a comfortable night. As a result of this application the diarrhœa ceased entirely, and the patient gradually recovered her strength.

Since that time she has been much better than she had been for years before. The bowel still comes down somewhat, but is not nearly so tender as formerly. The burning pain, which before was nearly constant, has almost ceased. She has but one evacuation in the twenty-four hours, and, although she has given up the bed-pan, the act of defecation is nearly free from pain.

Remarks. At the N. Y. Obstetrical Society, where this case was reported, Dr. Jacobi remarked that he had always avoided the tenesmus following such an application, by immediately injecting a strong solution of common salt. This neutralized the silver, and prevented any irritation of the anus, which he considered to be the cause of the tenesmus.

A CASE OF COMPOUND DEPRESSED FRACTURE OF THE
SKULL, IN WHICH THE DURA MATER WAS SUTURED
WITH CARBOLIZED CATGUT AFTER REMOVAL
OF THE DEPRESSED BONE. THYMOL
DRESSING. RECOVERY.

By W. T. BULL, M. D.

SURGEON TO CHAMBERS STREET HOSPITAL.

Michael Quinlan, a carpenter, 21 years old, in vigorous health, was struck on the head on July 15th, 1878, by a jack-plane, which fell from a height of three stories. He was unconscious for a few minutes, and was brought to the hospital in a carriage, suffering from dull pain in the head, but with pupils, pulse and respiration normal. Examination revealed a compound depressed fracture of the right parietal bone. The fractured portion was just behind the fronto-parietal suture, three-quarters of an inch to the right of the median line, and was triangular in shape (one inch long on each side), one angle being driven downwards fully three-quarters of an inch. The scalp wound was two and a half inches long, and curvilinear in form. Compresses, wet in thymol (1 to 1000), and an ice-bag were applied to the head.

Eight hours later the patient was etherized, and under thymol spray two pieces of the external table (about one-half inch square), and several smaller fragments of the internal table, were removed with the elevator and bone forceps. One or two spiculæ were removed from the brain substance through an L-shaped rent, one-half inch long in one direction, an inch and a half in the other. There was no serious laceration of the brain, but its exposed surface was ecchymosed and contused. The rent in the dura mater was closed with a continuous suture of carbolized catgut (the smallest size), the scalp wound united with silk sutures, drainage tubes inserted, and a dressing of thymolized gauze applied.

On the day after operation, the evening pulse was 80, and temperature 38.9° , and the patient had frontal headache and photophobia. Up to the eleventh day his condition was satisfactory, the pulse remaining below 86, and soft; the temperature below 37.8° . The dressing was changed four times, the discharge being slight in quantity, free from odor, and not purulent till the eighth day. On the twelfth day there was violent headache, vomiting and delirium, during which the dressing was torn off; pulse was 64, temperature 38.4° in the morning; pulse 80, temperature 38.9° in the evening. The scalp wound, which had united, was opened;

the dura mater found to be covered with grayish exudation; a hypodermic syringe and an exploring needle, thrust to the depth of one inch, did not discover pus; there was no trace of the catgut. The dressing was replaced by compresses wet in thymol, an ice-bag was applied to the head, a blister to the nape of the neck, and potassic bromide administered—1.33 grams every three or four hours. (The bowels had been kept open by occasional doses of calomel.) Within a week the bad symptoms disappeared. The wound granulated rapidly, and closed entirely in six weeks, and the patient was out of bed. Three months from the date of the injury he reported at the hospital, and the following note was made: "One or two little pieces of bone came away during last month. The sinuses are now closed. Has had occasional headache after unusual exertion, but feels perfectly well, and is doing light work."

We certainly need no further testimony to the value of carbolyzed catgut in surgical practice, but its use in this unusual locality has seemed to me to render the case worthy of mention. It was suggested to me by a similar case which I saw in the wards of Prof. Bardeleben in Berlin in 1872. Both the fracture and the laceration of the dura mater were much more extensive, and were situated in the right fronto-parietal region, and the patient made a good recovery.

ABCESS OF THE ARY-EPIGLOTTIC FOLD.

By ANDREW H. SMITH, M. D.

Mrs. S., aged about 52, a patient of Dr. C. H. Avery, by whom I was called in consultation. Patient has been suffering for some days from pain and soreness in swallowing, which she referred to the region of the larynx. She now complains of a sensation as of some foreign body in the throat, which she tries to swallow. She has felt this gradually increasing for two days. Respiration not impeded. Patient very nervous and apprehensive. Laryngoscopic examination showed an almost spherical tumor, the size of a small nutmeg, occupying the left aryl-epiglottic fold. The outline of the tumor was sharply defined, and the neighboring structures were but little infiltrated. The mass was wholly opaque, and at one point on its surface the epithelium was absent. Although it fell toward the glottis, the tumor did not fit accurately enough upon it to impede the entrance of air.

As to the nature of the growth, the history excluded everything except œdema, hæmatoma and abscess. In favor of the first was its very frequent occurrence in this location; against it were the opacity, and the sharply defined boundaries. The contained fluid was evidently confined to a single cavity, and not diffused through the meshes of the connective tissue. Against hæmatoma were the absence of any cause likely to lead to rupture of a vessel, and the *gradual* increase of the tumor in a tissue so loose as to oppose almost no obstacle to rapid effusion of blood if a rupture had taken place. Besides, a collection of blood with so thin a covering, would have given a dark color to the tumor.

The diagnosis of abscess was thus arrived at by exclusion, although I had not then, and have not since, been able to find a case recorded of abscess in this locality, where there was no history of implication of cartilage.

In view of the nervous state of the patient, and the absence of all dyspnœa, I advised waiting for spontaneous rupture, which appeared to me to be near at hand. It took place three or four hours after my visit, and an examination made some days later, showed only a depressed cicatrix in the slightly thickened fold.

CASE OF REMARKABLE SUSCEPTIBILITY TO THE INFLUENCE OF DUQUESNEL'S ACONITIA.

By ANDREW H. SMITH, M. D.

Mrs. A., aged about 48, a person of exceedingly nervous temperament, had several times each day, at irregular intervals, a sudden pricking sensation in the left anterior pillar of the fauces, followed by a pain darting up into the ear, suffusion of the left side of the face, and lachrymation of the corresponding eye. This would last only a minute or two, and then pass away for the time, to return in one, two or three hours. Inspection of the throat showed merely a slight redness. Local treatment with a spray of strong nitrate of silver produced no effect. .004 gram (one-sixteenth of a grain) of aconitia in a 60 gram (two-ounce) solution was then ordered. The patient took only half a teaspoonful of this the first time, equal to .00015 gram ($\frac{1}{448}$ of a grain), yet she experienced the physiological effects in a marked degree: numbness and pricking in the tongue, and a feeling of heaviness and constriction of the head. This lasted several hours. A full teaspoonful was taken again late in the afternoon, when

the same symptoms recurred, with the addition of numbness and heaviness of the arms, and an indescribable feeling of general depression and discomfort. She declined to take any more of the medicine. No effect was produced upon the neuralgia.

The patient was not advised beforehand of the physiological effect of the medicine.

TRAUMATIC ULNAR PARALYSIS.

By LEWIS A. STIMSON, M. D.

Samuel M., a glass-blower, 27 years old, presented himself November, 15th, 1878, for treatment for disability of the left hand, due, he said, to a cut inflicted upon the forearm by a broken pane of glass six months before. He stated that the bleeding was very free at first, and was arrested by the application of a ligature to a vessel in the wound. After the healing of the wound, which was not delayed by any complications, he found himself unable to open his hand completely, and this inability had persisted.

On examination a linear cicatrix was found on the anterior aspect of the left forearm, beginning on the radial side of the tendon of the flexor carpi radialis, nearly two inches above the styloid process of the radius, and passing obliquely downwards and inwards to the inner border of the ulna. By moving the fingers it was made evident that this cicatrix was adherent to the flexor tendons. The interosseous muscles of the hand and those of the hypothenar eminence were notably atrophied. The first row of phalanges were habitually held in the plane of the metacarpal bones, but could be slightly flexed and extended voluntarily. The phalanges of the second row were flexed at a right angle upon the first, and those of the third row to nearly the same degree upon the second. Voluntary extension, even in the slightest degree, of the last two rows was impossible, but by the use of moderate force the index and little fingers could be completely, and the middle and ring fingers almost completely, straightened. The obstacle to complete forcible extension lay in the adhesions between the flexor tendons and those of the palmaris longus and flexor carpi radialis at the cicatrix in the forearm. This was clearly shown by the fact that the forcible extension of the fingers made the upper portion of the last-named muscle tense and prominent beneath the skin. Voluntary lateral separation of the fingers was impossible. The thumb and wrist possessed their normal movements. There

was no numbness, no diminution of sensibility in any part of the hand, and the patient said there never had been any since the receipt of the injury.

The diagnosis of ulnar paralysis in this case is easily made when the distribution of the motor fibres of the ulnar nerve and the functions of the muscles supplied by them are considered. The ulnar nerve supplies, in addition to the muscles of the hypothenar eminence and the inner portion of the short flexor of the thumb, all the interosseous muscles and the two inner lumbricales. The power possessed by the interosseous muscles and the lumbricales of flexing the first row of phalanges and extending the distal ones, although pointed out by Fallopius as long ago as 1561, and by Albinus in 1734, and Sabatier in 1775, has received but little attention until recently, and even now is not mentioned in some of the standard text-books of anatomy. For the more general knowledge of this fact, which has obtained of late years, we are indebted to the publications of Duchenne de Boulogne and other neuro-pathologists and clinicists, who have shown its importance as an aid to accurate diagnosis of affections of the musculo-spiral and ulnar nerves. A beautiful and convincing demonstration of the function of these muscles can be made in lead paralysis or "wrist-drop," by showing that when the first row of phalanges is supported in the line of the metacarpal bones the patient has full power of voluntary extension of the distal ones. The limitation of the action of the *extensor communis digitorum* to the first row of phalanges is effected by means of fibrous prolongations or expansions passing from the sides and under surface of the tendons to the bases of these bones. It is worthy of mention that Prof. Wright Post was in the habit of teaching and demonstrating this function of the lumbricales in this city fifty years ago,¹ at a time when it was practically unknown to or ignored by the profession elsewhere.

The elements in the diagnosis of this case, therefore, may be formulated as follows: First, atrophy and loss of function of all muscles supplied by branches given off from the ulnar nerve below the wrist; second, a scar crossing the line of this nerve just above the wrist; and third, the history of perfect form and function previous to the receipt of the injury which occasioned the scar, and the appearance of the atrophy and permanent loss of function since that time.

Three points may require a word of explanation. First, the

¹ Oral communication from Prof. Alfred C. Post.

absence of any diminution of sensibility in the surface supplied by the sensory filaments of the ulnar nerve; second, the extension of the complete disability to the index and middle fingers; third, the absence of that exaggerated extension of the first row of phalanges, which is one of the characteristics of uncomplicated ulnar paralysis. The first was undoubtedly due to exceptionally free anastomosis between the terminal sensory branches of the ulnar and median nerves, and in part also, perhaps, to lack of observation. Second, it is true that extension of the distal phalanges of the index and middle fingers is effected in part by the corresponding lumbricales, and that these muscles receive motor filaments from the median nerve, and that, therefore, the disability of these fingers should not be so complete as that of the other two. In this case the patient was a day-laborer who had never had occasion to develop by exercise the finer motions of the fingers, and, furthermore, the power of the lumbricales had been diminished by their enforced rest for six months, and their action was impeded by the adhesions uniting the flexor tendons of the fingers to those of the wrist and to the skin at the scar. Third, the same adhesions explain the absence of exaggerated extension of the first row of phalanges.

The characteristic symptoms of ulnar paralysis are: The deformity known as the "claw-hand" (*main en griffe*), consisting in forced extension of the first row of phalanges and forced flexion of the second and third rows, with inability to voluntarily extend the latter, more marked in the ring and little fingers than in the index and medius, and more or less numbness, with occasional prickling in the skin of the ulnar side of the hand and ring finger and the little finger.

The treatment proposed was to search for and reunite the divided ends of the nerve, and, if necessary, to liberate the adherent tendons with antiseptic precautions. The patient declined the operation.

In a somewhat similiar case reported by Duplay in the *Bulletins de la Société de Chirurgie*, Dec. 31st, 1878, the paralysis which was due to a neuritis excited by a slight traumatism of the overlying tissues, was relieved by cutting down upon and stretching the nerve.

ARCHIVES OF MEDICINE.

Original Articles.

SELF-LIMITATION IN CASES OF PHTHISIS.*

By AUSTIN FLINT, M.D.,

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IT is now more than forty years since Jacob Bigelow applied the term self-limited to certain diseases. Quoting from his remarkable discourse, delivered before the Massachusetts Medical Society, in 1835, "By a self-limited disease, I would be understood to express one which receives limits from its own nature, and not from foreign influences; and which, after it has obtained foothold in the system, cannot, in the present state of our knowledge, be eradicated or abridged by art,—but to which there is due a certain succession of processes, to be completed after a certain time; which time and processes may vary with the constitution and condition of the patient, and may tend to death or to recovery, but are not known to be shortened or greatly changed, by medical treatment.†"

Using the term self-limitation as expressing an intrinsic tendency in a disease to pursue a certain course, irrespective of treatment, its application has been much extended since the publication of that discourse, by the study of the

* A discourse read before the New York Academy of Medicine, May, 1879.

† *Vide* Nature in Disease. By Jacob Bigelow. Boston, 1859.

natural history of diseases. A host of diseases have been shown to be self-limited. All the essential fevers, inclusive of acute pneumonia, and many acute inflammations, are, as the term has been defined, self-limited diseases. It was proved in 1863 that acute rheumatism or rheumatic fever, and in 1875 that acute dysentery belong in this category.* If the term be used in a sense embracing different degrees of that attribute of disease which renders it independent of treatment, as regards course and termination, most diseases are more or less self-limited; and it is of interest to inquire, in different diseases and in different cases of the same disease, how far the course and termination may be due to self-limitation.

My first object in this discourse is to show that the favorable course and ending in certain cases of pneumonic phthisis are determined by self-limitation.

More than twenty years ago, in a paper published in the *American Journal of Medical Sciences*, (January, 1858), it was claimed in behalf of this disease, that it may be self-limited. This claim was based on the results of an analysis of twenty-four cases which had ended in recovery. The claim was renewed in a paper read before the New York Academy of Medicine, in 1863, and published in the *Transactions of the Academy*. It has since been reiterated, after the analytical study of a larger number of cases, in my work on the principles and practice of medicine, and in a more recent work on phthisis. If called upon, however, at the present time, to name a disease which does not exemplify self-limitation, perhaps pneumonic phthisis or pulmonary consumption, would at once suggest itself in the mind of most physicians. Judging from the impressions

* *Vide* Articles in the *American Journal of Medical Sciences*, July, 1873, and July, 1875.

derived, not alone from intercourse with medical practitioners, but from medical writers, of all diseases, this is one which is least expected to end favorably from an intrinsic tendency. If I mistake not, it is generally supposed to tend always to a progressive course, and cessation of its progress is considered as implying always some extrinsic agency by means of which it has been arrested. I propose to show the incorrectness of these views. But let me first inquire, what is necessary to establish the fact of the favorable course and termination of this or of any other disease being due to self-limitation.

A disease is, in this sense, self-limited when it ends in recovery irrespective of extrinsic influences derived from either hygiene or therapeutics. A patient, whatever be the disease, who recovers without any potential remedies or measures of treatment having been employed, and, where there has been no material change in any of the circumstances pertaining to daily life, owes the recovery exclusively to self-limitation; in other words, the favorable course and termination are due to an intrinsic tendency. This intrinsic tendency may often be promoted by judicious treatment; and to endeavor to do this is a rational object of therapeutics. On the other hand, this tendency may be obstructed by injudicious treatment—a result which, of course, the physician endeavors to avoid.

Self-limitation cannot be inferred from a single case or a very few cases, for this reason: The course and termination of a disease may be affected by influences which are extrinsic but not apparent. In order to obviate liability to error on this score, the number of cases must be sufficient to render it extremely improbable that all such influences could have been overlooked. It is needless to say that the cases from which the inference of self-limitation is drawn must be carefully and honestly observed. Another condition is essen-

tial, namely, there must be no room for doubt as to the accuracy of the diagnosis.

The difficulties in the way of collecting cases of certain diseases, with a view to test self-limitation, are obvious. If deliberately observed for this purpose, the physician must be able to reconcile to his conscience the proceeding. Assuming that he can do this, how seldom, in a disease like phthisis, could the concurrence of patients be obtained? Indeed, no phthisical patient would or should consent to comply with the conditions required for such an object of clinical study. The cases collected, therefore, must be those in which, independently of a deliberate purpose on the part of physician or patient, either the disease was allowed to pursue its course without any treatment, or the treatment was of such a character that no curative influence could be attributed to it. Cases in which these conditions are fulfilled are rare, but during a period of thirty-four years I have preserved the histories of a number amply sufficient to substantiate the statement that, in certain cases, pneumonic phthisis, or pulmonary consumption, ceases to be progressive, and may end in recovery from self-limitation.

The question will be asked: What meaning do you attach to the terms pneumonic phthisis and pulmonary consumption? I do not include under these names acute tuberculosis. This is a distinct disease. As justly remarked by Andrew Clark, from a clinical point of view it has more the characters of an essential fever than of a local affection. I exclude also the affections known as interstitial pneumonia, cirrhosis of lung or fibroid phthisis. Existing alone, this disease has characters sufficiently distinctive. I shall consider in this discourse the terms pneumonic phthisis or pulmonary consumption as applicable to all cases of phthisical disease, exclusive of acute tuberculosis or interstitial pneumonia, not raising any inquiry as to distinct

forms of phthysical disease aside from the latter affections, and neither affirming nor denying their existence. With this understanding, I proceed to the evidence of self-limitation in cases of pneumonic phthisis or pulmonary consumption, using, instead of those names, the term phthisis, for the sake of brevity:

Of 670 cases of phthisis noted during thirty-four years, the list embracing a few cases of acute tuberculosis and interstitial pneumonia, 44 ended in recovery. In my work on phthisis, published in 1875, the details of the history of each of these 44 cases are given sufficiently to render evident the fact of recovery and the correctness of the diagnosis. I refer to this work for these details. In 31 cases the disease ceased to progress, remaining non-progressive for at least several months, and in the majority of the cases for several years. In these 31 cases the phthysical disease may be considered as ended, complete recovery from its effects, or the lesions incident thereto not taking place. As cases for analytical study, with reference to the agencies causing the cessation of the disease, these 31 cases of non-progressive phthisis are hardly less valuable than those in which there was complete recovery. Adding the two groups, there are 75 cases in which either recovery from phthisis took place or the disease ceased to progress.

Such a collection of cases offers a rich field for clinical study with reference to several points of inquiry having important bearings on prognosis and treatment. I shall take up here but one of these, namely, the proof of self-limitation. In how many of these cases is it evident from the histories that the disease was not arrested by either medicinal or hygienic treatment? The answer to this question furnishes the proof of self-limitation.

Of the 44 cases ending in recovery, in 23 there was no medicinal treatment to which an arrest of the disease could

be attributed. In several of these 23 cases there was no medicinal treatment; in the remainder of the cases the treatment consisted of simple tonics, cough palliatives, or remedies to meet some other symptomatic indication. In none of the cases could the treatment be considered as curative. Of the 31 cases in which the disease was non-progressive without complete recovery, in 15 there was no medication by which it might be supposed that the disease was controlled, and in several none whatever. I call attention to the fact that in two groups of cases, namely, those ending in recovery and those in which the disease was non-progressive without recovery, medicinal treatment was either wanting or in no degree curative in about an equal proportion, being, in the first group, 23 of 44, and in the second group, 15 of 31. It may fairly be surmised that this fact has a significance beyond mere coincidence.

In respect of hygienic treatment, in some cases of both groups there was no change whatever in habits of life. In other cases there were changes involving more favorable circumstances pertaining to hygiene; but in a considerable portion these changes were not of such a character that a potential influence could be attributed thereto. It is probably correct to say that the changes may have favored recovery or non-progression, but were inadequate to cause an arrest of the disease.

In my work on phthisis, a history of each of the cases now referred to is introduced. To recite the histories here would require too much time. I will ask only those who may be so disposed, to examine them, as contained in the work, for the correctness of the diagnosis, the recovery or non-progression, the duration of the disease, and other points of interest. I claim that these histories substantiate self-limitation in cases of phthisis. They show that this disease may cease to progress, and end in recovery, because it is self-limited.

I cannot cite authorities supporting this claim in behalf of phthisis. I am unable to refer to authors who have declared in distinct terms that this is ever a self-limited disease. That it is so in a certain proportion of the cases in which it ceases to progress and ends in recovery, is a logical conclusion based on the considerable number of histories to which I have referred.

The curability of phthisis is by no means a novel doctrine. Since the physical diagnosis of this disease has been brought to a demonstrative precision, all observers of much experience will agree that patients have recovered, even after considerable solidification of lung and the formation of cavities. Moreover, this fact has been abundantly demonstrated by post-mortem examinations. But in all these instances the disease has been supposed to be cured, sometimes by medicinal and sometimes by hygienic treatment, or by both combined. The position has not been taken by others, so far as I know, that the recovery in certain of these instances was spontaneous, that is, attributable to self-limitation.

My first object in this discourse is to show that I have been warranted in taking this position by the facts to which I have referred.

My second object is to consider briefly self-limitation as bearing on the conclusions drawn from clinical studies in respect of the treatment of phthisis.

If the disease in any instances end in recovery exclusively from an intrinsic tendency, it is evident that self-limitation must be more or less concerned in the cases which recover under different measures of treatment. Speaking as if it were an entity, self-limitation is a factor co-working in certain cases with curative measures, and, as may perhaps be added, sometimes effective in spite of

measures which obstruct its operation. On the other hand, when this factor is feeble or wanting, curative treatment is not likely to prove of much avail. Evidently, in drawing conclusions respecting the curative effect of remedies, allowance is to be made for this factor. The extent of its co-working doubtless differs much in different cases, in some being sufficient in itself, and, in others, either considerable, moderate or slight. Considering that the agency of this factor has not been hitherto recognized, it is easy to explain the well-known fact that, from time to time, various methods of treating phthisis, apparently successful in some striking instances, have failed speedily to meet the expectations excited by their apparent success. Whatever was really due more or less to self-limitation, was attributed solely to the methods of treatment, and when the former was feeble or wanting, the latter gave little or no evidence of curative power. This is the rationale of the *post hoc ergo propter hoc* fallacy which has always had much to do with false deductions from therapeutical experience.

Recovery from phthisis, in order to become proof of the success of any treatment, must have taken place in a number of instances treated by that method so large as to render it certain that the real agency could not have been self-limitation. Judged by this rule, the materia medica, with our present knowledge, offers few resources for the cure of this disease. And yet, it would be unjust to therapeutics to say that remedies are powerless. It is doubtless true that judicious medication may often coöperate with self-limitation and secure success, when the latter unaided would have proved unsuccessful.

I do not propose in this discourse to consider particular measures, medicinal and hygienic, of treating phthisis. For the sake of illustration, however, I will allude to climatic influences. At the present time, change of climate

for patients living where climatic influences are deemed unfavorable, is regarded as the most important measure in the early stage of the disease.

When this measure of treatment is decided upon, the question is often asked, what part of the world is best suited for consumptive patients? It must be a great relief to physicians to have formed convictions which determine a prompt and positive answer to this question. But undertaking to reach definite conclusions resting on the basis of results, is not a ready route to convictions. The experience in different cases with regard to places of resort is discrepant. It happened to me once to see on the same day two phthisical patients who had recently returned from Nice. One was loud in praises of its climatic advantages. "I advise you," said he, "by all means to send your patients to Nice; they will do well there if improvement be possible anywhere." This patient had had considerable solidification followed by well-marked cavernous signs. He recovered from phthisis, and died many years afterward of an acute disease. The other patient was as energetic in his disparagement of Nice as a place of resort for consumptives. He was not less earnest in his advice never to send patients there. This patient not long afterward succumbed to the disease. The first of these two patients improved continuously, not only at Nice, but at the Adirondacks and in this city, without any important medication. The second steadily declined. Self-limitation was in the one case effective, and in the other case wanting.

It is easy to understand that the appreciation of the climatic influence in a particular situation may be greatly exaggerated if a conclusion be drawn from a single case or a few cases in which the course of the disease has been favorable, and, on the other hand, that the influence may be unjustly depreciated, if a conclusion be drawn from a limited number of instances in which the course of the disease has

been unfavorable. I do not mean to imply that differences as regards self-limitation alone explain the discrepancy in personal experience which will be found to apply to all situations; but this discrepancy is in a measure to be thus explained. A much more reliable and the only truly scientific plan of investigation with a view to conclusions respecting a change of climate, is to study the different results in a number of cases. I have analyzed the histories of seventy-four cases in which a temporary change of climate was an important, and, in some instance, the chief measure of treatment, without regard to the particular climate resorted to, the stage of the disease, or other circumstances which have an obvious bearing on the results. Of these seventy-four cases, in nine the disease ended in recovery, and in thirteen it was non-progressive. The proportion of twenty-two out of seventy-four cases, is certainly large enough to warrant the conclusion that more or less curative influence was due to climate. Moreover, studying the histories closely, it appeared that in thirty-four additional cases there was evidence afforded by the symptoms of benefit, leaving only eleven cases in which no improvement followed the change of climate. While self-limitation doubtless, played a part in these results, it certainly cannot account for them to the exclusion of climatic influence.

These results relate to different climates collectively. If by the same method of investigation it be sought to determine the comparative advantages of particular climates, we have to deal with a complex problem. A complete comparison would require the histories of a considerable number of patients in each one of the various resorts embraced within the range of inquiry. There must be at least an approach to uniformity in all the cases as regards the stage of the disease, its extent, and a diversity of other circumstances. No single observer can accumulate data sufficient

for such an undertaking. It would, however, be fair to take the results of all climates as a standard for reference, and bring into comparison the results of the analytical study of a considerable number of cases observed at any one, or a few, of the numerous places of resort. This might be done by observers residing in different places. In this way very valuable data could be obtained for judging of the comparative advantages of different climates. The value of such data would be incomparably greater than any theoretical opinions in regard to the benefit of altitude, dryness of the atmosphere, temperature, pine woods' exhalations, etc. If, in addition to comparing results in particular places with those of different climates collectively, a comparison were to be made with the proportion of cases in which there is either recovery or cessation of progress without change of climate, it would be practicable to estimate, with some approximation to accuracy, curative climatic influences, disconnected from the accessory circumstances, prominent among which is self-limitation. Single examples of recovery, however remarkable, are entitled to little weight as evidence of the curative effect either of climate or any particular measure of treatment. In one of the most striking of the instances which have fallen under my observation, the recovery took place in this city, and without any important medication. The signs of excavation gradually disappeared, in this case the site and size of the cavity being indicated by a permanent circumscribed depression of the chest-wall. This was nearly twenty years ago, and the patient is now free from symptoms of pulmonary disease. The efficient factor in this instance must have been self-limitation. How often is it that individual instances like this one are considered as illustrative of the curative efficacy of a particular climate, or of some other measure of treatment !

In dealing with cases of phthisis, the inquiry where is the

best place for consumptives is highly important, and cannot be altogether waived; but I do not propose here to state the difficulties and the various considerations which the answer involves, in the existing state of our knowledge. Suffice it to say that the selection of a place of resort is to be governed by the circumstances proper to each case, and not by any rule applicable alike to all cases. My object in alluding to climate has been simply to illustrate the bearing of self-limitation on the conclusions drawn from clinical studies respecting climatic treatment; and the remarks which have been made are applicable to other hygienic measures, and to different kinds of medication. An important point in clinical studies with reference to all these, should be to take cognizance of the relative agency of self-limitation as a factor or co-worker in determining the favorable course of the disease.

Is it possible, by means of symptoms and signs, to judge whether there be, or be not, an intrinsic tendency to a favorable course and termination? Can a given case be investigated with reference to the existence and degree of this tendency, or is self-limitation always a matter of retrospection? The bearing of these questions on the prognosis is obvious. It is extremely desirable to be able, in individual cases, to form a judgment respecting these points of inquiry. It is practicable to obtain important information, warranting something more than a mere conjecture, from both symptoms and signs. What I shall state in this connection is based upon the clinical study of cases which exemplified recovery or cessation of progress from self-limitation, as contrasted with other cases.

The symptoms which warrant hope and sometimes even an expectation of a favorable course and termination, relate especially to the circulation, the body heat, alimentation and nutrition. Persistent frequency of the pulse, fever,

anorexia and progressive emaciation oppose reliance on self-limitation. *Per contra*, encouragement on this score is warrantable when the pulse is but little, if at all, more frequent than in health; the temperature of the body not much, if any, raised; the appetite in a great measure retained, and loss of weight inconsiderable. These and other symptomatic conditions which render it possible, if not probable, that the disease tends intrinsically to recovery, may be summed up in one word—tolerance. In proportion as phthisis is well tolerated, there is room for hoping that it will prove self-limited. If the tolerance be deficient, self-limitation is proportionably weak or wanting.

The signs obtained by auscultation and percussion represent the local physical conditions, the latter representing the degree and extent of the pulmonary affection. Other things being equal, the chances of recovery by self-limitation are greater, the smaller the amount of phthisical lesions, and the space in which they are localized. I have been led to believe that phthisis not very infrequently ends by self-limitation before it has made sufficient progress to develop well marked physical signs. In other words, there are abortive cases of this as of other diseases. How often are the traces of an old, small phthisical affection found in bodies dead with various diseases! I have met with instances of, as I supposed, abortive phthisis. These cases are apt to be misapprehended, the more because the general belief is that exceptions to the rule of progress are extremely rare.

I have learned, however, from histories which I have recorded and reported, that self-limitation may be exemplified notwithstanding a large area of solidification followed by cavities of considerable size. The most reliable of the points on which a hopeful prognosis is to be predicated in these cases, is the confinement of the affection within circumscribed limits, that is, absence of signs denoting progressive exten-

sion or general diffusion. The extent and degree of lesions, if circumscribed, do not prevent the disease from being self-limited, but they stand in the way of complete recovery. In most of the cases of non-progressive phthisis without recovery, the lesions do not admit of restoration, although the phthisical disease may be said to have ceased—the lesions in these cases remain as sequels like, for example, the intestinal ulcerations resulting, in tropical climates, from acute dysentery.

Aside from the symptoms and signs to be taken into account in forming a judgment respecting self-limitation, my clinical studies have shown that age and sex have no special significance. They show, what could not have been anticipated, that heredity is not incompatible with an intrinsic tendency to recovery. Among my cases of recovery are two sisters, now living and well, who alone remain of a phthisical family, both parents, three sisters and two brothers having died with phthisis. The two sisters now living, one of whom recovered more than 15 and the other more than 20 years ago, had no important treatment, either medicinal or hygienic, whereas there were changes of climate and the persistent use of remedies in the cases of a dead sister and the two brothers. These facts render striking the fact of self-limitation in the cases which recovered. Confining myself to a simple statement, I will add that my histories afford evidence that profuse and repeatedly occurring hæmoptysis, chronic laryngitis, pleurisy with effusion and perineal fistula, are by no means in all cases unfavorable as regards prognosis based on self-limitation.

In conclusion, it must be admitted that the characteristics of the medical practice of to-day have resulted in no small measure from the knowledge which has been acquired of the natural history of diseases. And the practical applica-

tions of this knowledge have had relation especially to self-limitation. Bigelow, when he distinguished certain diseases as self-limited, probably had but a faint apprehension of the scope of this well-chosen term. The boundaries of its fullest extension are yet to be ascertained. Much knowledge of the natural history of diseases still remains to be acquired. It could hardly have been conjectured by Bigelow, when his discourse was written, that phthisis would be included among the self-limited diseases. The extent of influence referable to self-limitation in this disease, is by no means fully ascertained. There is ample room for further observations which bear upon this point of inquiry. Impressed with the importance of clinical studies having this direction, I cannot forbear the remark that they promise more in the way of practical utility than the continued discussion of histologico-pathological questions relating to phthisis, which, of late years, have engrossed so much attention and occupied so large a space in medical literature.

A NEW CLASSIFICATION OF PHTHISIS PULMONALIS, WITH REFERENCE TO SPECIAL TREATMENT.

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THE tendency of the present time is to re-arrange and to classify specific divisions of medical subjects in order to their thorough elucidation.

Not more than a quarter of a century ago, Dr. Samuel Henry Dickson, one of the most accomplished and scholarly physicians of his age, and representing the advanced thought of his time, described typhus fever as one disease, with lesions of the head, with lesions of the chest and with lesions of the abdomen.

These divisions included all of those which we now call typhus fever, typhoid fever and typhoid pneumonia. It was an intelligent attempt to bring order out of chaos.

Dr. Murchison and others have shown that these divisions comprise separate unities widely differing in causation, history, physical signs and in pathological changes, with the happy result of indicating a more rational and far more successful treatment.

That which has been done for the family of typhoid diseases remains to be perfected in that of phthisis.

Sydenham says: "There are several kinds of consumption. The first mostly arises from taking cold in winter;

abundance of persons being seized with a cough upon the coming in of cold weather a little before the winter solstice, which, happening to such as have naturally weak lungs, those parts must needs be still more weakened by frequent fits of coughing, and become so diseased at length hereby as to be utterly unable to assimilate their proper nourishment.

"Hence, a copious crude phlegm is collected. The lungs being hereby supplied with purulent matter taint the whole mass of blood therewith, whence arises a putrid fever, the fit whereof comes towards evening and goes off towards morning, with profuse and debilitating sweats. And when the lungs lose their natural tone, tubercles ordinarily breed therein. * * When this disease is confirmed, it for the most part proves incurable." A good description for one two hundred years old.

Laennec and his followers classed everything in pulmonary phthisis as tubercular. "This," he says, "I think is the only kind of phthisis which we should admit, unless indeed, it were the phthisis nervosa and the chronic catarrh simulating tuberculous phthisis.

Broussais held with the ancients that phthisis may result from inflammation, but Laennec charged him with doing so by assertion and ratiocination however rather than by facts. The tide of Laennec's well earned fame has floated some errors down to our own time, especially one which throws contempt upon the observations of his eminent compeer.

Sir James Clark, Sir John Forbes and other English writers who had learned immediately from Laennec and Louis followed strictly in the line of the great French leaders and created, so to speak, *a tubercular public opinion*. But now a wider and more catholic view is being taken by English and American physicians who are conservative and practical rather than hypothetical.

Dr. Andrew Clark of London, in a lecture at Bellevue Hospital last autumn and which was reported in the *New York Medical Record*, divided phthisis into three, as he said, natural classes, viz., Tubercular, Catarrhal Pneumonia, and Fibroid. Tubercular and fibroid are great natural divisions, and are descriptive of great pathological conditions and differences. In one there results death of tissues, in the other functional incapacity. In both there are cough, expectoration and wasting—and there may be hæmoptysis, but even in these particulars common to both they are individually as different as they are in their grander distinctions.

Indeed, they are opposite diseases of the same organ, which, did they not frequently coalesce, producing new diseases by their combinations would be described always as distinct.

Niemeyer, leading the modern school of pathological physicians, includes all these under the term Catarrhal Pneumonia which I shall endeavor to show farther on is not fully descriptive of the cause nor of the morbid results.

The following classification is one which my clinical experience confirmed by autopsical examinations has led me to adopt.

FIRST CLASS,
OR
TUBERCULAR PHTHISIS.

First Division.—Uncomplicated Tubercular Lung.

Second Division.—Adherent Pleuræ, Tubercular Lung.

SECOND CLASS,
OR
FIBROID PHTHISIS.

First Division.—Adherent Pleuræ, Fibroid Lung.

Second Division.—Adherent Pleuræ, Tuberculated Fibroid Lung.

This classification covers the whole ground,—including accidents and complications.

First Class, First Division.

Uncomplicated Tubercular.—Tubercular concretions and cavities in the lung without adherent pleuræ or fibroid—sacculated tubercle—latent phthisis.

This form of phthisis is rare.

Louis says: “Nothing was so frequent as the adhesions of the lungs to the pleuræ, for in a hundred and twelve cases there only existed *one* in which the two lungs were free in the whole of their extent. We have only found the right lung completely without adhesions eight times; the left only seven, and in these cases there were either no tuberculous excavations or only those of very limited dimensions.”

Laennec and Louis include all those cases which are obscure in diagnosis, especially in the earlier stages, under the term latent phthisis. “These differences in the order and duration of the morbid phenomena do not interfere with the regular progress of the disease—do not, so to express ourselves, alter its physiognomy; but there are instances when its characters are so completely modified that its recognition is impossible before its progress is considerable; it is, in fact, *latent* for a longer or shorter period. At other times it assumes the form and progress of acute diseases, its different periods seem confounded together, and the diagnosis is not less obscure than the opposite condition.”*

The early history of the first division of tubercular phthisis is generally overlooked on account of the obscurity of the physical signs and symptoms, owing to the fact that there are no adhesions to convey the sounds of morbid changes in the lung into the chest-wall for easy recogni-

* Phthisis by Louis. Chap. VIII, 372. (Translated by Chas. Cowan, M.D., Washington, 1876.)

tion ; the first observed evidences of the disease being those connected with the formation of a cavity.

The predisposing cause is a strong proclivity from inherited tendency. It occurs most frequently in early adult life or in middle age, and its immediate cause is local or systemic irritation. Acute tuberculosis occurs in children at the period of dentition, at puberty and in middle life. The relation of acute tuberculosis to tubercular condition of the lungs, to my mind, is not absolutely clear, but clinically children liable to head troubles in infancy, if they live to adult age, may have phthisis. Both in children and at adolescence the manifestations of tubercular invasions may occur in persons of full habit, with abundance of adipose.

At the first thought this seems incongruous, for tubercle is the feeblest of neoplasms, and runs a rapid course of degeneration ; but we must remember that adipose is not of itself a sign of strength, but in tubercular cases it exists at the period of invasion, connected with a marked prostration of vital power. Should a case be under skilled observation before the appearance of cavities, it may be noticed that there is deficiency of true respiratory murmur, especially over the site of forming concretions, while at the same time there is slightly raised pitch under percussion. There are no rhonchi, rales, sibilus or cough. But just so soon as the nodules or encysted tubercle begin to soften, there will be prostration, rise of temperature, quickened pulse and hurried breathing—perhaps cough and slight expectoration if the concretions should be near bronchial tubes, but when the abscess opens into a bronchus there may be expectoration of characteristic matter, and there may be fatal pneumorrhagia, depending upon the erosion of an artery occurring at the same time. Then for the first time the physical signs of a cavity are discoverable, but they are by no means so plain as when there are interpleural adhesions and fibroid

lung. Healthy lung structure is a poor conductor of sound ; but an attentive ear will discover a low note of amphoric character, especially in expiration. Should the cavity be large and connected with a large bronchus, there may be gurgling when it contains fluid. Coughing and expectoration are never excessive as they may be in fibroid phthisis. Wasting and loss of weight commence to rapidly increase after the occurrence of cavities, as do also hectic, night-sweats, loss of appetite, etc. Louis gives two varieties of the latent form of phthisis. One rapid in its course, ending in a few weeks without any arrest in progress, while the other may linger and for a time give some hope of recovery. I have seen both these varieties, but unfortunately have no notes taken during the progress of the disease. One, in which there was an arrest of progress of disease in the lung, died with marked signs of meningeal tuberculosis.

Laennec also refers to *latent phthisis* and *acute phthisis*, but not in so clear a manner as Louis, and without detailing physical signs or post-mortem examinations. Except incidentally in one case, "a girl, eighteen years of age, who died in the hospital *Cochin*, without any emaciation, or other symptom except those of a severe feverish catarrh of less than a month's duration. Upon examining the body, the lungs were found filled with tubercles more or less softened, of a size almost uniform, and none less than a filbert or almond."*

Rindfleisch says: "That tuberculous phthisis is only a combination of scrofulous inflammation and tubercles."†

"Nodules as large as a pea, or even a walnut are not uncommon."‡

Treatment.—The early management of a case is in its prevention. Scrofulous diathesis indicates that the individual

* Laennec. Forbes, Trans., 4th edition, p. 328 and 329.

† Ziemssen, vol. V, p. 635, American edition.

‡ *Ib. id.* p. 642.

should be kept under the best hygienic influences, out-door exercise, pure air and appropriate food, and that any local or systemic source of irritation should be removed. I consider chloride of ammonium as a preventive as well as a curative agent of very great value. It may be used in baths, by inhalation and by enema, as well as by the stomach. Dissolved in Bay-rum it is a pleasant sponge-bath, with a flannel cloth night and morning. By inhalation in all the catarrhal conditions of the nasal and upper air-passages. By enema in threatened meningitis of children, and by the stomach in deep-seated "colds."

Should the disease have commenced, cod-liver oil, tonics, aids to digestion generally, change of air and scene in addition to hygienic conditions and chloride of ammonium may be beneficial. Also, digitalis sustains the action of the heart when enfeebled; atropia control night-sweats; quinine and arsenic are anti-periodic, and may be adjuvant according to individual indications.

I have no doubt also that iron and iodine may be of great value in purifying and enriching the blood.

Recent excavations may be kept at rest, preventing extension of disease and of pneumorrhagia by strapping the affected side with elastic adhesive plasters.

Small blisters frequently applied over and around the region of excavations assist in arresting progress of disease.

Stimulants, when they promote sleep and digestion, should be taken at meals and at bed-time. Food should be abundant, easily digestible, varied and moderately stimulating.

Forced expansion of the chest when nodules are softening, or after an excavation has been formed, must, of necessity be avoided. But when the danger of hemorrhage has passed, it may be gradually resumed. A fatal hemorrhage rarely takes place after a cavity is a week old. Eroded arteries contract speedily.

Inhalations of medicated vapor may soothe irritation in the upper bronchiæ, prevent ulceration in the larynx and trachea, and may even reach excavations opening into large bronchiæ. A certain amount of medication may enter the system, especially chloride of ammonium, but we must remember that the residual air resists the entrance of irritating vapor into the true respiratory system; hence, there is generally disappointment where much benefit has been anticipated.

Second division of the first or tubercular class. Tubercular nodules and cavities following pleural adhesions.

The only difference of the second division of the tubercular class from the first is, that it commences with plastic exudation within the pleuræ,—sacculated or nodular phthisis very soon following. This division is larger than the uncomplicated tubercular, and is remarkable for the frequency in which it is terminated by fatal accidents, pneumorrhagia and hydropneumothorax. These accidents may occur in the first division as well as in the second or tuberculated division of fibroid phthisis, but in an experience of thirty years I do not remember a single case of fatal pneumorrhagia occurring in any but in the second division of tubercular phthisis, at least none others were verified by post-mortem examinations.

In the first division of the first class the occurrence of tubercle is apparently spontaneous. If pleuritic adhesions afterwards occur, they are accidental, and appear near the end of the disease; but in the second class adhesions precede and seem to excite tubercular deposits. I am fully aware that this fact cannot be fully appreciated except by those capable of recognizing the initial stage of interpleural plastic exudation.*

* See Dr. Brown-Séquard's *Archives of Scientific and Practical Medicine*, March, 1873; the *Medical Record*, May 25, 1878.

However, if my position is correct, the immediate reabsorption of the plastic exudation may prevent tubercular deposits and its dangerous liabilities.

The following history in fatal cases usually obtains: Plastic exudation takes place within the pleuræ, over the upper half of the lungs, and tubercular concretions mostly centric are formed, and pass to the period of softening. Early in the disease one or more open into a bronchus, and if a branch of the pulmonary artery passing through the abscess opens at the same time, instantly blood will fill the air passages in that side of the chest, and rising into the trachea, run over, filling the air passages in the other side of the chest—a few mouthfuls of blood are expectorated, when the mouth and nose fill with frothy blood, the patient strangles—is literally drowned in a few minutes.*

The fatal occurrence of pneumorrhagia is always a surprise to the physician as well as to the patient and his friends, as the first indications of danger are only recognized when it is too late. The formation of tubercular nodules, centric, in otherwise healthy lung, underneath adhesions and thickened pleuræ, cannot be diagnosticated, for there are no physical signs.

Post mortem examinations show a few tubercular concretions, mostly central, near blood-vessels and bronchiæ, one or two of which have opened into a bronchus and into a branch of the pulmonary artery at the same time, and the bronchial tubes are filled with blood.

Should a softening nodule open into the pleuræ, letting in air and fluid, we would have hydropneumothorax. This accident occurs suddenly, causing great pain and dyspnœa. Sometimes the patient dies from the shock, or he may linger a few days; occasionally months. Some have recovered.

* Case viii., Physical Signs of Interpleural Pathological Processes. *Medical Record*, May 26, 1878.

The diagnosis is easy. The sudden pain and dyspnœa direct attention to the affected side, and the tympanitic resonance under percussion, with amphoric respiration and metallic tinkling, are decisive.

Treatment will consist in immediately strapping the affected side with elastic adhesive plasters, relieving pain and controlling inflammation. If the amount of fluid escaping into the plural cavity is small, the opening through the pleura may be closed, the fluid absorbed, and the patient live.

The consideration of both divisions of the tubercular class fully justifies the popular belief in the fatality of consumption. Fortunately the number is much less than that of the fibroid class, which is amenable to treatment.

SECOND CLASS.—FIBROID.

First Division.—Adherent Pluræ, with Fibroid Lung.

This division represents a disease entirely opposed to that of the first division of the tubercular class.

In this there is loss of function only, in that necrosis of tissue, with loss of substance.

Many times, doubtless, pure fibroid has been mistaken for tuberculated fibroid phthisis, the second division of this class, on account of the gurgling rales being misinterpreted as signs of cavernules in the lungs.

The physical signs of plastic exudation are soft, tearing, crepitant and sub-crepitant rales near the ear—not more than five or six lines distant—which are often present without any expectoration or cough, and which are heard in the same place from day to day.

If they were caused by mucus in the bronchial tubes, they would almost necessarily be accompanied by expectoration and cough; they would be at different distances from the ear—never so near, and would change their locality and quality at each examination.

I believe that nine-tenths of all forms of phthisis commence with interpleural plastic exudation, which is removable, when fresh, by proper management.

In consequence it is of the utmost importance that an early diagnosis should be made, in order that judicious but simple management, aided, if necessary, by positive treatment, may clear up all signs of the exudation, and in accomplishing this, arrest the tendency to phthisis, diminishing the number of victims of the most common and the most fatal of diseases.

The inherited proclivities in fibroid phthisis are gout, gouty rheumatism and syphilis—factors of vital depression favorable to plastic exudation.

But many times the proclivity is acquired, where the heredity is of health. Anxiety of mind, mental or vital depression long continued, may inaugurate a tendency to plastic exudation in the most healthful organization. Instances of a surviving husband or wife after long watching at the bedside of one dying with phthisis, becoming consumptive, are not unusual.

So frequent is this the case, that the question of the transmissibility of phthisis has been mooted; but a conclusive answer is, that whatever may have been the character of the lingering disease of the first, the second resulting, always begins with plastic exudation.

Mental Depression.—Students, men in exciting business, and lovers, when unsuccessful, are liable to interpleural exudation, which may be the beginning of phthisis. Soldiers after a defeat are liable to phthisis or typhoid.

Vital Depression.—Syphilis, or masturbation in those just arriving at adult age, smallpox, or other of the exanthematous diseases, a badly managed pleurisy or pleuropneumonia, malaria, a wasting ulcer, a capital operation in surgery may be followed by plastic exudation, which may end in consumption.

The depressing causes are so numerous, that it is a wonder that these serious consequences from plastic exudations are not oftener observed. The exudation is no doubt much more frequent than we are aware, as many times it is immediately re-absorbed, and at other times, although becoming organized, it may be of such limited extent, and so placed, as to remain innocuous during life. The exudation is a makeshift, as it were, of nature, and it is only when she is unable to remove it again that it becomes a source of inconvenience or of danger. If not re-absorbed, it becomes organized, and contracts according to a natural law. The effect of which upon the pulmonary pleura is to press it down on the air sacs immediately underneath, closing them and arresting the capillary circulation, which is then thrown back upon its two sources of pulmonary supply, that of the pulmonary artery and that of the bronchial, through the nutrient arteries. The obstruction to the circulation of the blood from the pulmonary artery is not of much importance, but that of the capillaries of the nutrient arteries seriously interferes with the circulation through the bronchial arteries. The nutrient arteries of the true respiratory system of the lungs are derived from the bronchial. They have no *venæ comites* to return their blood to the right heart for re-aëration, as all other arteries of the body have. The blood which they carry to the tissues of the true respiratory system for its nutrition is re-aërated as it passes through the capillaries into the radicles of the pulmonary vein—never becoming venous in character.

This anatomical peculiarity is the key to many otherwise inexplicable phenomena of diseases of the lungs and of the pleuræ. It explains bronchorrhagia and bronchorrhœa. As before said, fibrination having taken place upon the pulmonary pleura, and contracting, the blood in the nutrient arteries, is "backwatered," so to speak, upon the bronchial,

whose only relief is transfusion through the mucous membrane, of blood, fibrine, serum or mucus.

Consequently the indications are that the bronchorrhagia or bronchorrhœa following should be treated as effects, and not as diseases. They are the natural results of the capillary obstruction. Such bronchorrhœa is different from primary catarrh, inasmuch as its primary cause is not in the mucous membrane, but far removed from it. Also fibrination within the pleuræ alone is not pneumonia, as has been mistakenly diagnosticated.

A careful physical examination will show that at this stage all the changes that have taken place are within the pleuræ. For these pregnant reasons I cannot accept the term catarrhal pneumonia as descriptive of its pathological processes. All of these signs and conditions are the accumulating results of obstruction of the capillaries immediately subtending the pulmonary pleuræ.

From time to time fibrination progresses induced by slight causes, until the patient yields to the crippling process of contraction, stoops forward, with hurried breathing and spasmodic cough. Old adhesions are reinforced by new exudation caused by colds, fatigue, emotion or "worry."

The second stage of the first division now commences when the inflammatory process begins to extend into and through the lung itself, and portion after portion of the true respiratory system becomes involved in the contracting fibroid. The heart and lungs are displaced upwards or bound to the chest wall. Cardiac murmurs result which may deceive the physician into making an error in diagnosis, of heart disease. The heart struggles, palpitates, sometimes hypertrophies or dilates and fails to properly carry on the circulation, stasis, increased fibrination, continually recurring, spasmodic, strangling, almost suffocating cough, fill up a picture of a pitiable condition. Autopsies

confirm the diagnosis in a remarkable manner. Adhesions within the pleuræ fasten the lung to the chest wall, sometimes to the mediastinum, the pericardial sac to the lungs, and all are drawn out of their normal position until the apex of the heart has been found on a level with the lower border of the fourth rib.*

The earliest physical signs of fibroid are simply those of plastic exudation within the pleuræ. The percussion note is slightly flat, and raised in pitch as if parchment or paper were spread over the chest wall. The rales are fine, soft, moist, tearing. It requires a practiced ear sometimes to discover these delicate signs, but even a beginner in auscultation will notice that the respiration is harsher over some one region of the affected chest than another; let him fix his attention in listening to this rough respiration, and fill his own lungs at the same time and in the same way as does the patient, and after a little while he will be able to analyse this roughness, and find that it is made up of innumerable moist, soft, rales, very fine and very frequent. At the same time he may hear the true respiratory murmur, when it exists, just beyond the interpleural rales, with just as much certainty in measuring the distance as he could do it by sight, welling up under the pleuræ at the end of a full inspiration like the distant roar of the sea. When he finally hears these rales and distinguishes at the same time the true respiratory murmur, he will be convinced of two important facts, that there is lymph exudation within the pleuræ and that the lungs are free. In time, these soft, almost unrecognizable rales become more distinct, even dry and crackling, and then all doubt of their existence is cleared up.

There may be an abundance of rales with neither cough

*Case IV, Phys. Signs. of In. Pl. Path. Process. *The Medical Record*, May 15th, 1878.

nor expectoration; but unless the exudation is re-absorbed they will begin in time; at first viscid mucus, colorless or slightly tinged with blood, but afterwards becoming profuse and assuming a greenish hue.

The dyspnœa is frequently out of all proportion to the amount of pathological results in the pleuræ or of the congestion of the lungs.

If the serious mistake has been made of considering the early signs of plastic exudation as those of catarrh or of bronchitis, strong adhesions may result and become a point of irritation, which may continually induce new exudation and increased disability.

The physical signs of firm adhesions are greater flatness under percussion, and perhaps a shade of dulness over areas of thickened pleura or of condensation of lung, with a great variety of rales, fine, dry, moist, coarse, or a combination of all of these. The rational signs are distressing dyspnœa; spasmodic coughing, with copious expectoration; irregular palpitation of the heart; temperature varying from natural to 38.9°C. 40°C.; variable appetite; sometimes sleeping quietly when lying down; in other cases catching what sleep they can in an arm-chair, or sitting up and leaning forward in bed; progressive emaciation and debility, until a new cold, greater hyperæmia, fresh exudation, and the life is closed out. Louis notes that in autopsies it was found that fresh plastic exudation, occurring in the last days of exhausted vitality, was evidence of debility. No doubt it is so at the commencement as well as at the end in phthisis cases.

Treatment of first division of the fibroid class is an easy problem at the beginning, but grows more difficult every day of its after existence. Organization may take place very soon after exudation, but generally appropriate management will cause its speedy removal. Even when the exudation is some weeks or months old, *positive* treatment

will soon clear up the evidences of disability and disease. Regulated or systematic expansion of the chest in the open air, with appropriate food, are of the first importance. Walking, or riding on horseback, in the country, and habitually filling the lungs and holding the breath a little more and a little longer than usual, with milk diet in abundance, is generally sufficient in recent exudation without medication.

CASE 1ST.—Rev.— 34 years old, born in New Jersey ; father died at the age of 54 of phthisis ; family history otherwise good. During the great heat of last summer, ministerial duties were heavy, was depressed about business affairs, and began to be ill. After feeling weak and “out of sorts” for some time, was taken with hæmoptysis on the morning of July 13, 1878. Became apprehensive, sleepless, could eat, but had no appetite ; fell in weight from 122 to 117 pounds. Hawked up mucus, but had no cough proper. When lying down could hear whirring noises in chest. Had stitches mostly in left side about the heart, with palpitation. Physical examination discovered a few distinct rales over right lung ; left side a few rales at upper part, but in the lower part an abundance of fine, sub-crepitant rales back and front. Respiration feeble ; could not fill the chest fully in inspiration ; no dulness, but a little flatness under percussion in lower part of left side.

Diagnosis.—Plastic exudation within the pleuræ, mostly in the lower part of the left. Directed systematic expansion of chest in open air, walking, with milk diet. Took no medicine except cod-liver oil ; rubbed down with English glove night and morning.

Re-examined Nov. 7, 1878. Respiration and expansion improved, but rales remain.

Re-examined March 1, 1879. All signs of exudation have disappeared. Allowed to return to his ministerial duties. Weight, 130 pounds. Eats well ; sleeps well, unless excited, and feels well. Walks five or six miles every afternoon, in addition to outdoor exercise in the morning ; has walked ten or twelve miles in a day without over fatigue. Chest was measured on the 16th of November last, and again first of April ; under the arms, and under nipple. Gained under the arms, after exhausting the lungs half an inch, in ordinary respiration three fourths of an inch, and one inch and one-fourth after full inspiration. Under nipple gained half an inch in forced expiration, one and three-fourths inches in ordinary respiration and two inches in full inspiration.

With mild medication the time of recovery may be shortened, and its use is advisable if there is doubt about the organization of the exudation.

CASE 3.—D. E. returned from Florida in the spring of 1878. Took cold about two months before leaving the South ; continued to cough, rapidly lost weight, from 180 to 160 lbs. ; had two attacks of hæmoptysis. Physical examination discovered subcrepitous rales right side posteriorly ; appetite poor ; dyspnœa on exertion. Advised to go to Harper's Ferry, Va., and commence walking eight to fifteen miles each day, systematically expanding the chest, and living on milk diet, and in addition to take a cold infusion of wild cherry bark with chloride of ammonium—two ounces of the bark and one of ammonium in two pints of cold water ; tablespoonful about every hour. This was done strictly, and he returned in about three weeks. All signs of plastic exudation had disappeared ; had regained the weight he had lost ; had no cough, no dyspnœa in exercise, and has remained well since.

But should the system be in no condition to respond to those simple measures, or if the organization of the exudation has resulted in firm adhesions of the pleuræ, with commencing consolidation of the lung, and the simple means fail, it may be necessary to resort to positive medication by mercurials—calomel and Dover's powder in small doses until the teeth are tender, which may be followed by bichloride of mercury in Huxham's tincture of bark in small doses, and may be continued for months in addition to the chloride of ammonium, and systematic expansion of the chest in the open air, milk diet, etc.

CASE 3.—A. R., native of Scotland, 39 years of age, clerk. Family history good. Weight in health, 165 lbs. Began to be ill in 1874. Frequently took colds ; had "catarrh," but kept at business ; gradually grew worse. In 1875 had some inflammation of the chest, which was checked ; had severe coughing spells, with loss of strength and short breath ; all symptoms growing gradually worse until October, 1878, when he came to be examined.

Pulse frequent and irritable ; breathing hurried ; constant

coughing ; expectorating yellowish thick mucus ; appetite poor ; disturbed sleep ; weighed 130 lbs.

Physical examination.—Almost no expansion in right side ; restricted on left ; dulness over right lung, especially over middle portion ; not so great over left ; fine dry rales over right side, especially over middle portion ; some crackling rales at summit of right lung ; softer tearing rales over left side.

Diagnosis.—Extensive adhesions in both pleuræ ; old and organized in the right, with consolidation of middle portion of lung ; fibroid phthisis, second stage.

Placed him at once on calomel and Dover's powder, to make the teeth sore ; then to follow with chloride of ammonium and wild cherry bark, cold infusion, and frequent small blisters ; systematic expansion of the chest in the open air, freedom from business, milk diet, etc. The mercurial treatment was resumed three times, and carried to the point of mercurialization, followed by blisters, etc., with marked improvement of rational and physical signs ; chloride of ammonium and wild cherry bark, with bichloride of mercury, one-thirty-second of a grain three times daily in a compound tincture of Peruvian bark were continued afterwards.

He was permitted to return to his business in January.

Re-examined April 22, 1875.—Has gained twenty pounds in weight since October last. Has no cough ; pulse natural ; respiration quiet ; temperature, 37° C. (98.6° F.).

Physical examination shows increased expansion of chest ; no dulness ; a little flatness ; some thickened pleuræ still remains over middle portion of right lung behind ; no rales on either side.

Has not yet regained full strength, although very much improved ; a little short breathed on severe exertion ; eats well, sleeps well, and feels perfectly well when not over exercising.

When the fibroid is extensive both in the pleuræ and in the lung, as in the above case, mercurialization to the point of salivation may be absolutely necessary to relieve the patient. The result in case 3 was exceptionally favorable, and cannot be regarded as the rule for all cases of fibroid in the second stage. Yet to save one such case from among a number is very encouraging. The careful physician, who knows how to use his tools, will have no fear of doing injury. He will carry the use of this powerful remedy just so

far as is necessary to accomplish the desired end, and no further. The blister will be most efficient when the system is under the influence of the mercurial.

Systematic expansion of the chest must not for one moment be lost sight of, no matter what form of medication may be adopted. Indeed it should be considered that all medication is auxiliary to expansion—to make expansion possible.

Gently filling the lungs, holding the breath, depending upon the rarefaction of the cool, inspired air after mixing with the heated, residual air, to dilate the lungs and gain expansion of the chest. When there is no irritation of the lungs or pleuræ the air may be forced into the lungs and held as long as possible, that contracting adhesions may be overcome.

Accurate measurements of the chest should be made and recorded at intervals, that progress may be ascertained and the patient encouraged. Perhaps no simple method of gradual expansion is more effectual than riding on a fast walking horse. The instinctive balancing of one's self on the horse in the rolling motion of fast walking keeps the chest expanded, and systematically exercises all the muscles of the body without fatigue. In forcible expansion care must be taken not to do harm. Adhesions must not be violently torn nor put upon the stretch, or the result may be extension of inflammatory action and further disability by new exudation. The pleura has been torn from the lung by the accident of falling, and death has resulted from hemorrhage resembling pulmonary apoplexy.

In connection with systematic expansion the subject of climate is important, as expansion in pure air is more beneficial than in bad air. Change of scene and of accustomed thought is desirable, also out-door exercise and cheerful amusement with a congenial friend in a cool equable

climate free from malaria, in balsamic forests. But even then change should be had. The patient does best who goes from place to place. The influence of change upon the digestive organs is a matter of common observation. Sea voyages for those living inland, to the mountains for those living by the sea, even from a good to a poor climate may give a temporary benefit. I have known patients to improve rapidly by coming from healthy hill countries to New York, which certainly cannot boast of perfect climate for a phthisis patient.

Any one locality, however good, should not be recommended for all. One whose taste runs in that direction will do best where there is hardship and roughing it, with plenty of incident, while others, and especially women, may do better in congenial society, surrounded by the elegancies and comforts of fashionable life.

We have on our continent every variety of climate and scene, California, Colorado, Minnesota, Canada, Texas, Florida, North and South Carolina, Georgia and Virginia, or the Adirondacs. Short voyages also bring us to the Bermudas and West India Islands.

But if there is progression in fibrination, the time may come when the patient must desist from exercise, and keep his room or even his bed for a lengthened period, using the gentlest means to keep the chest expanded, living upon the most nutritious and stimulating food. Using rectal alimentation with defibrinated blood, intelligent mercurialization, blistering, and tonics to cause re-absorption of newly exuded matter which may so free the lungs again, that outdoor gentle exercise may be resumed, when Summer has set in. From the latter part of February until the first week in June, a phthisis patient who cannot seek a better climate, should keep his room by a cheerful fire, and take only such exercise as he can indoors.

Second Division of Fibroid, or Second Class. Tuberculated fibroid Phthisis.

To this division belong the great majority of the cases of phthisis which come under our observation, too late for curative treatment.

The disease is essentially fibroid; the tubercular element is a complication and is accidental. Niemeyer says that the fear in a case of catarrhal pneumonia is that it may become tubercular. Substituting fibroid for catarrhal pneumonia, I would entirely agree with his anxiety in regard to this complication. The lowered vital power in a fibroid lung or pleura, with the constant irritation caused by the interpleural adhesions invite the exudation of tubercle. A scrofulous diathesis with fibroid lung is almost certain to become tuberculated, and it is this fact which makes it so necessary to watch and to remove the first beginnings of the fibroid condition.

The causes, history, physical signs and treatment of this division up to the time of tuberculation have already been glanced at in the consideration of the first division of the fibroid class. The new physical signs denoting the advent of tuberculation will need to be watched for with great assiduity, for upon their appearance or non-appearance depends very largely the hope or despair which will govern the efforts for cure or for palliation.

These signs are areas of dulness with raised pitch under percussion, with loss of true respiratory murmur, followed by bronchial breathing, bronchophony, raised temperature, hurried pulse and respiration. Decided exacerbations, chill, fever and sweating, periodically returning. The cold sweat coming on after midnight is like the approach of death, and is horrible to the patient.

When the tubercular masses soften and open into a bronchus, the characteristic expectoration may announce

the formation of a cavity or the expectoration may not be observed. A general amelioration of all the symptoms may occur at this period. The chills and fever may subside, the pulse and temperature may fall to normal, the respiration become slower and fuller, the hectic and night sweat disappear. Perhaps the patient begins to eat and sleep well, and from this time forward there may be continuous improvement.

Great injustice may happen to the attendant physician should he be changed for another a short time before the formation of a cavity, for the great improvement of all the symptoms will naturally be attributed to the new doctor. Many patent medicines have gained great popularity from having been "*tried*" in the right time. But unfortunately for the patient such complete relief is not always obtained. Other tuberculations may also be going through the same process of softening and the amelioration may be but partial and only for a short time.

The physical signs of a cavity are made exceedingly plain by the good sound conducting quality of fibroid lung and adherent pleuræ. The cavernous or amphoric respiration, and the reverberations or echoes of rales and gurgles in the cavities with pectoriloquy, vocal and whispering, leave no doubt of what has taken place.

Auscultation may discover remaining concretions which may soften in time and repeat the same signs and symptoms until they also are discharged.

The condition of cavities may be studied for the benefit of the patient: As to whether they are empty or filled or partly filled with fluid. Also, as to the manner of their opening into a bronchus, from the walls of the cavity or from the roof or from the floor. Should the opening be from the bottom of the cavity it will always be empty when the patient is in an upright position. Should it be from the top

of the cavity it may be overlooked during examinations made in the middle of the day, the usual time of visits, but may be readily discovered early in the morning or after the patient has retired in the evening, times when the cavity will be partly empty from the recumbency of the patient.

A knowledge of these simple facts gained by careful auscultation may be utilized for the comfort of the sufferer.

Learning the *manner* of the connection with a bronchus may enable us to relieve distressing night-cough without the use of opiates. A patient may sleep quietly after retiring, for some hours, and then be awakened and kept awake by cough the rest of the night, or he may commence coughing the moment he lies down or turns upon one side, and he instinctively seeks the position which gives him most ease from strangling cough, and submits to a constant teasing cough that only yields to large doses of opium. After examination teach him to take that position which will soonest empty the cavity and to keep it, notwithstanding the coughing, until the cavity is thoroughly emptied, then he can take his usual position and sleep quietly until morning.

These practical facts were embodied in a paper prepared for the Academy of Medicine by the late Dr. Geo. P. Cammann, and which I had the honor of reading before the Academy after the writer's death.

Cavities in the lungs are not always of a tuberculous origin. A portion of lung tissue may necrose from strangulation by contracting fibroid and become gangrenous, and a cavity result which may remain open or even enlarge by wasting from its walls, or it may be of traumatic origin. I have known one to occur from tapping with a trocar into a lung bound to the chest walls by adhesions. A ball of lead has been the cause of a cavity after having been in the lung for many years. From whatever cause, a cavity in the lung is a grave accident.

Dry crackling rales from old pleuretic adhesions are loudly echoed in a cavity near the surface of the lung and assist in differentiating it from a dilated bronchus, in which they are much feeblor, if heard at all, and the sound seems to escape, while in a cavity they are defined and echoed from the walls.

Cracked pot sound is also easily distinguished when the cavity is near the surface, but even when centric the expert ear may catch the peculiarity of the double-echoed quality of sound with that of the sudden expulsion of air into the bronchus.

Treatment of the tuberculated division of the second class must be a judicious combination of that already given for fibroid and for purely tubercular, with the hope of delaying progress, if not of arresting it altogether.

The earliest signs of plastic exudation within the pleuræ must be heeded and removed, is the lesson that the consideration of this formidable disease impresses upon us, but if the fibroid lung has become tuberculated, there must be a double endeavor to prevent the extension both of fibroid and of the tubercular. The resort to mercurials must be more sparingly made than in the purely fibroid, and yet they must not be wholly disused. The bichloride of mercury with tonics will be the principal resort. Chloride of ammonium will be of more value than in either the pure tubercular or fibroid alone, as it meets the indications in both. The exercise must be adapted to the conditions, and too forcible expansion must not be made. Milk diet in large quantities must be encouraged and insisted upon.

Lord Bacon says in effect that many believe they cannot take milk without becoming bilious, because they take but little at a time, which coagulates, but that if they take large draughts, the acid is diluted, and digestion will take place.

I have repeatedly demonstrated the truth of his observation. In order to take large quantities of milk, it is necessary to proscribe other kinds of animal food. Two or three quarts of good milk may be taken daily for weeks even by a feeble person. The stomach must be educated to receive this quantity, and it must be done gradually. In fibroid phthisis the patients are apt to be carnivorous, and have contracted stomachs, so that at first they are unable to take a large amount of food at one time. But system and perseverance will overcome this difficulty. By the constant use of milk the stomach dilates, and the blood-vessels enlarge, and more nutrition is carried to the capillaries, and weight of the body will be increased.

The increase in weight, which comes to drinkers of large quantities of any liquid, is owing to this acquired capacity to receive nutrition. Large quantities of milk at regular intervals, with systematic expansion of the chest, stands first in importance in treatment of all forms of fibroid phthisis. The deposit of fat in the system is an assurance that phthisis is held in abeyance. Occasionally a change may be made, and a mixed diet of more stimulating food may be allowed, to continue only for a short time, again to return to strict milk diet, until health is restored.

The subject of tubercle I have not attempted to discuss, and the same may be said of minute pathology and histology, except in a clinical and practical way, leaving the niceties to be settled by those who are making them a subject of particular study.

SOME NEW POINTS ON THE PATHOLOGICAL ANATOMY OF TETANUS.*

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Until within a few years, the pathological anatomy of tetanus was involved in the greatest obscurity.

This did not depend, however, on the lack of post mortem examinations, for their records are numerous, but on the fact that in so few instances the microscope was used to verify gross lesions and to detect minute ones.

Investigators contented themselves by saying "the nerve looked inflamed or the cord congested or softened," and so, wanting sufficient evidence of actual lesions, the profession gradually came to look on tetanus as a purely functional disease.

In the year 1854, appeared J. L. Clarke's report † of the microscopic examinations of the spinal cord in two cases of tetanus, in which he found changes hitherto unknown. He noted a granular exudation in the anterior fissure, general dilatation of the blood-vessels and granular matter in the perivascular spaces.

In 1865 appeared a report of four new cases by the same author.‡ In one of these the medulla oblongata was examined and found normal. The lesions were found in the

* Read before the New York Neurological Society, April 7, 1879.

† *London Lancet*, Sept. 3, 1864.

‡ *Med. Chir. Trans.*, London, Vol. XLVIII, p. 255, 1865.

spinal cord chiefly in the gray matter. They consisted in dilatation of the arteries, hemorrhages, areas of disintegration and cavities containing granular fluid, clear colloid material or débris of nerve-tissue.

In 1868 W. H. Dickinson,* examining the cord of a case of traumatic tetanus, found repletion of the blood-vessels, extravasations, and structureless, transparent material about the blood-vessels and in the nerve-tissue in both gray and white matter. This exudation sometimes occupied pre-existing cavities and sometimes seemed to have torn the nerve-tissue assunder. This substance, he says is stained pink by carmine.

In 1869 Ogle,† in a case of traumatic tetanus, found the fissures of the cord, especially the anterior, occupied by an exudation.

In 1871 T. C. Allbutt,‡ in examining the spinal cords of four cases, found congestion of the vessels with thickening of their walls, large and small hemorrhages, granular exudations through the walls of the vessels, stuffing of the central canal with epithelium, yellow degeneration of the motor cells and spots of granular disintegration in different situations.

In 1871-2 Clarke again comes forward reporting § the microscopic examination of two more cases of tetanus. In one case there was congestion of the cerebral gray matter. There was also a recent, extra-meningeal blood-clot in the anterior part of the cervical and dorsal regions, dilatation of the blood-vessels, exudation of a homogeneous material, chiefly between the posterior cornua, and irregular cavities in the medulla oblongata.

In the second case he found a coagulum surrounding the

* *Med. Chir. Trans.*, London, Vol. LI, p. 265, 1868.

† *British and Foreign Med. Chir. Rev.*, April, 1869.

‡ *Trans. London Path. Soc.*, Vol. XXII, p. 27, 1871.

§ *St. Geo. Hosp. Reports*, Vol. VI, pp. 319 and 336, 1871-2.

theca vertebralis in the dorsal and lumbar regions, dilatation of the blood-vessels and exudation of a transparent, homogeneous material.

In 1872 Michaud * noticed the exudation of plasma from the vessels, and an aggregation of nucleated corpuscles in both commissures all around the central canal.

In 1873 Allbutt † in examining the cords of four cases found the vessels thickened, distended and plugged, hemorrhages, submeningeal and into the cord, softening of the cord, stuffing of the central canal with epithelium, nuclear proliferation of connective tissue and atrophy of the cells in the anterior horns.

Fox ‡ in 1874 announces the finding of congestion of the spinal pia mater, some new cellular material on the inner surface of the dura mater, colloid degeneration of the white and amyloid degeneration of the gray matter of the cord.

In 1875 Richelot, § quotes Joffroy || as finding in the pons, medulla and cord, vascular distention and hemorrhages.

He quotes Quinquaud ¶ as finding vascular distension in the floor of the fourth ventricle, oil globules and amyloid bodies outside the vessels in the cord.

Liouville (Soc. Biologie 1869), he quotes as describing the lesions in the cervico-dorsal region of the cord, as distension and at places, aneurysmal dilatation of the blood-vessels, hemorrhages and a granular, pigmented condition of the nerve cells; and in the dorsal region a sero-sanguineous effusion about the posterior spinal nerve roots.

* *Arch. de Phys.*, p. 60, Jan., 1872.

† *British and Foreign Med. Chir. Rev.*, April, 1873, p. 383.

‡ *Path. Anatomy of the Nervous Centres*, p. 355, 1874.

§ Richelot, *Pathogénie, Marche, Terminaisons du Tétanos*.

|| *Soc. de Biol.*, 1870, *Mem.* p. 14.

¶ Leclerc, *Considérations sur le tétanos traumatique*, Thèse de Paris, 1872.

Aufrecht * in 1878 found lesions confined chiefly to the cervical region of the cord.

They consisted in hyperæmia, some hyaline exudation about the vessels and in the central canal, degeneration and atrophy of the cells in both anterior and posterior horns and some spots of granular disintegration.

Woods † in 1878 records the finding of vascular distention, mostly about the central canal, round bodies in the perivascular spaces and granular disintegrations of the posterior horns.

In the medulla oblongata which he examined, he noted vascular dilatation about the hypoglossal and pneumogastric nuclei and in the floor of the fourth ventricle.

He also gives a sketch of an enlarged blood-vessel near the hypoglossal nucleus.

It were an injustice, even while confining our attention to those authorities who supplemented their investigations by microscopic examinations, to pass over in silence the clinico-pathological investigations of one of our most original men.

Dr. J. Marion Sims as early as 1846 ‡ 1848, § stated it as his conviction that the form of tetanus, known as trismus neonatorum, was caused by the pressure of the occiput, depressed during labor or by dorsal decubitus, on the medulla oblongata. This, to his mind, was conclusively proven by the results of autopsies, where the occiput was found depressed, and by the fact that a vast majority of his cases were cured by a lateral or facial decubitus alone.

In locating the seat of the disease in the medulla and pons, he by far antedated many of his successors.

* *Deutsche med. Woch.*, Nos. 14 and 15, 1878. Quoted in *Am. Jr. Med. Sci.*, July, 1878; *Br. Med. Jr.*, May, 1878; and *Chicago Jr. Ment. and Nervous Diseases*, Oct., 1878.

† *London Lancet*, Sept. 7, 1878, p. 326.

‡ *Am. Jr. Med. Sci.*, April, 1846.

§ *Am. Jr. Med. Sci.*, July and October, 1848.

An article by Gowers * deserves notice as demonstrating the existence of lesions like those found in tetanus, in the medulla and pons of a person dying of the very similar disease, hydrophobia.

Some facts of great importance in further study will strike one on looking over the literature of tetanus. While some have considered the disease functional and without lesion; while others have paid special attention to the condition of nerves in and leading from the wound; while, as most of the authors above quoted, others have in the spinal cord sought the only lesion; how few have gone one step higher, and in the medulla oblongata and pons varolii sought the characteristic lesion?

No systematic attempt seems to have been made to reconcile the location of the lesions with the prominent symptoms.

In the typical case followed to a fatal termination, the lesions should correspond to the symptoms present before death.

For example, at an autopsy there is found an embolus impacted in the left middle cerebral artery, shutting off the blood-current from the centre for speech, and the motor centre for the right side of the face and body. On ascertaining the history of the case, it is found the patient was suddenly seized with right hemiplegia and aphasia.

Here the location of the lesion explains fully the symptoms.

The lesions of tetanus, however, have never been made to harmonize with the symptoms.

To the end of making clearer, this part especially, of the pathological anatomy of tetanus, the following case † is presented without further preface.

* Trans. Lond. Path. Soc., 1877.

† The case was under the care of Dr. T. M. Markoe in the New York Hospital, and is used with his permission.

BERTHA B., aged 15 years, domestic, German. About 5 P.M., June 30, 1877, patient fell two stories, receiving a contused and lacerated wound 5 cm. long, extending transversely across the palm-surface of the right wrist. Through this wound protruded the lower extremity of the upper fragment of the fractured radius. There was also a slight contusion of the right ankle and back.

On admission there was considerable pain, hemorrhage and shock.

Reduction of the protruding radius was attempted, under ether, without avail.

July 1st.—The patient complains of great pain in the arm, which is subdued by morphia administered hypodermically.

July 2d.—Under ether, the protruding bone was cut off and reduction accomplished. The soft parts about and in the wound were in a gangrenous state.

July 3d.—Pulse, 88; temperature (axillary), 38.9° C., (102° F.).

July 5th.—At 10 A.M., trismus set in. The teeth at times very firmly clinched, often biting the tongue. At 3 P.M., temperature in axilla, 39.5° C., (103.1° F.). 5.30 P.M., temperature in axilla 40.5° C., (104.9° F.). 5.30 P.M., temperature on right cheek, 39.0° C., (102.2° F.). About this time the patient complained of pain and stiffness in the back of the neck, thirst and fever, and was very desirous of being fanned. Dysphagia or difficulty in swallowing now began to manifest itself, and tonic spasms of the sterno-mastoid and trapezius muscles.

A short time after the "*risus sardonicus*" set in. In this case there was no elevation or depression of the angles of the mouth, giving the face a smiling or forbidding look, but there was simply a retraction of the angles of the mouth with some separation of the lips so as to show the teeth.

7.30 P.M., the patient's cheeks are very red and hot, her face is covered with large drops of perspiration. She is still perfectly conscious and complains of heat and pain. She asked to have the wooden wedge, put between the teeth to prevent biting the tongue, removed.

Respiration was now hurried, the *alnæ nasi* rose and fell, the inspiratory movements were labored and often interrupted by a spasm of the glottis causing impending suffocation. The pulse was rapid and regular, and the extremities cool.

8 P.M., the struggle for breath ceased. The respiration assumed a Cheyne-Stokes character, *i. e.*, intervals of complete absence of respiratory movements alternated with about equal periods of

more or less normal respiration. The apnœic periods became longer, the consciousness was lost, the cheeks paled, the eyes fixed, the jaw fell, the spasms relaxed, and at 8.15 P.M., death ensued.

Temperature 5 min. later in the axilla being 43.3° C., (110° F.), and on the surface of the abdomen 40.5° C., (105° F.).

AUTOPSY 13 HOURS AFTER DEATH.

Temperature in axilla 33.5° C., (92.3° F.), and on abdomen 31.25° C., (88° F.).

The rigor mortis was wanting in the parts tetanized before death.

The cerebral sinuses were filled with blood.

The brain was superficially finely injected on the superior surface of the occipital lobes. There was a vertebral artery only on the left side.

The lungs were œdematous.

Thin, semi-organized clots were adherent to the mitral and tricuspid valves.

The spleen was enlarged and softened. An examination of the right forearm showed rupture of the tendons of the palmaris longus and the outer part of the flexor carpi ulnaris, while some of the deep and superficial flexor tendons were partly ruptured.

The median nerve was stretched and contused, and was of a green color. There was partial rupture of the internal lateral ligament of the wrist-joint tearing off the styloid process of the ulna. There was a "green stick" fracture of the ulna about 5 cm. above its lower extremity and a compound fracture of the radius about 2 cm. from its lower articular surface.

A great many signs of blood poisoning were found in the organs which are not mentioned.

The pons, medulla oblongata and upper cervical cord, together with the right median nerve were removed and put in Müller's fluid for preservation and hardening.

For the detection of lesions, the pons, medulla and cord having been hardened in Müller's fluid and alcohol, were placed in a microtome, and horizontal transverse sections made at short distances all the way from the upper part of the cervical enlargement of the cord to the upper border of the pons. These sections stained by carmine and put through Clarke's process, *i. e.*, absolute alcohol and oil of cloves, were mounted in Canada balsam.

In studying the present case, it will be well to take up first the general lesions and their nature, and then go on to a more minute study of the location and significance of these lesions.

In examining the sections, the first deviation from the normal structure was noticed in the pia mater. It was thickened and vascular. On its free surface there was a considerable recent exudation product, composed of fibrine and cells, and everywhere in its meshes, especially around the blood-vessels, there were a great number of very large cells, (see Fig. 2), some fusiform and some multipolar, very coarsely granular, pigmented and with large oval nuclei. These cells are still better brought out by teasing a little pia mater when they appear as dark, granular, spindle-shaped cells, some 1 mm. long, whose large oval nucleus without a nucleolus appears like a vacuole. (See Fig. 3).

Carmine did not affect these cells at all.

The next lesions found were hyperæmia and thrombosis. In many places the larger vessels seemed filled to repletion, (see Fig. 5), while at some points arteries, veins and capillaries were so universally over-distended with blood elements, as to suggest the possibility of an embolic or thrombotic process. (See Fig. 5). The vessel walls did not seem, as some have described them, thickened, but on the other hand thinned, from continued over-distention.

There was seen at certain spots enormous dilatation of the

perivascular spaces, some of which were partly filled by a small-celled, granular exudation from the vessel, to whose adventitia it was greatly adherent. The walls of these spaces presented a dense infiltrated margin. (See Fig. 5).

The next lesion consisted in cavities of various sizes in the nerve matter, some empty, others filled by a transparent, colloid material containing some small granules, but no cells or nerve debris. The small empty cavities may have been perivascular spaces from which the contained vessel had dropped out, but to the walls of the larger ones might be seen still adherent, some of the colloid material. The walls of these cavities have an organized look, not a ragged disintegrated edge. (See Fig. 4).

The connective-tissue bands were enlarged, and the increase in the number of fixed connective-tissue cells was shown by the nuclear proliferation.

The central canal of the cord was choked with desquamated epithelium, and there was a granular degeneration of some nerve cells.

The first three sets of lesion named will be designated the meningeal, vascular and cavernous, respectively. Having enumerated in general the lesions found in the present case, it will be seen that few of them present the charm of novelty, but it will be the aim of the present paper to elicit some new facts as to the hitherto unknown location of the already known lesions.

The sections are now taken in order from below upwards, and the character and distribution of the lesions will be more minutely studied. The meningeal lesion is confined to the upper part of the cervical cord, ceasing at the lower part of the medulla.

It is especially manifested about the nerve roots, both anterior, posterior, (see Fig. 2), and spinal accessory. In some places the inflamed membrane surrounds and

seems to constrict the roots as they emerge, and in others the new cells have pierced the nerve-bundle.

In sections of the upper cervical cord, few lesions but those of the pia mater were seen. On closer inspection however, changes in the nerve-tissue were noticed which will be better understood by a brief demonstration of the parts. The only respect in which they materially differ from the spinal cord lower down, is this: Nerve fibres are seen curving back from the motor cells of the anterior horns, which, joined by fibres emerging from the central gray matter, pass from the gray matter to a point midway between the anterior and posterior horns. (See Fig. 7).

Here also are seen longitudinal bundles of fibres coming from cells lower down, and from time to time curving over (see Fig. 6), and passing obliquely through the lateral columns to emerge a little nearer the posterior than the anterior roots. (See Fig. 7).

This is the first appearance of the spinal accessory root fibres.

In the central gray matter, from which so many fibres come, existed all along engorged blood-vessels, enlarged perivascular spaces, with exudation and vacuoles. (See Fig. 8).

A peculiarity worthy of note existed in the central gray matter here. In sections all along here for several millimetres there existed, very near the central canal of the cord, an enlarged perivascular space containing a large artery and vein, and several small vessels.

The artery was empty, the vein distended with blood-corpuscles, and around and between all there was in the perivascular space, a coarsely granular material holding in its substance some small cells, (probably white blood-corpuscles), and quite a number of the large black cells above described, as existing in such quantities in the pia mater. Their

relations to the blood-vessels are thus pretty clearly set forth for they are not seen in the fissures, where the pia mater extends without large blood-vessels.

The central gray matter around the enlarged perivascular space and also around the central canal, (the lumen of which was occluded), was thickened and infiltrated with granular matter. (See Fig. 8).

Among the ascending bundles of the accessory root-fibres existed also the same lesions here and there. The fibres traversing the lateral columns were also accompanied for long distances, and crossed here and there by stuffed blood-vessels, enlarged perivascular spaces and cell exudations.

These lesions, of themselves, would be of little moment did they appear elsewhere in the section, but the fact of their being almost exclusively confined to the spinal accessory tract, renders them objects of suspicion. (See dotted line Fig. 7).

The inflamed pia mater affects, as was before stated, the spinal accessory as well as the other nerve-roots.

In sections higher up in the decussation of the pyramids there is quite general distention of blood-vessels, but the gross vascular lesions and vacuoles are almost exclusively confined to the spinal accessory tract. Here and lower down the central canal is filled with desquamated epithelium and the gray matter around it has a dense, granular look.

The next group of sections show the central canal just opening out into the fourth ventricle.

There was seen in the origin and course of the hypoglossal nerve very marked vascular lesions, (see Fig. 9), and, in its course through the olivary bodies, large vacuoles and areas of disintegration.

In the origin and course of the vagus numerous small vascular lesions exist, but no changes of magnitude.

In sections higher up when the glosso-pharyngeal and

higher still, the auditory nerves occupy the posterior and lateral regions of the medulla, occupied lower down by the vagus, the lesions were chiefly confined to the hypoglossal tract, whose long nucleus traverses the whole of this space.

In the course of its fibres through the olivary bodies, the lesions were of more magnitude and consisted of immense perivascular spaces and large vacuoles.

In the glosso-pharyngeal tract the minor vascular lesions were quite abundant, as they were also in the lower facial nucleus. Higher than this, at the lower margin of the pons, in sections bringing the common nucleus of the abducens and facial into view, very few lesions are detected and these are of a vascular nature.

In these sections, the commencement of the motor nucleus of the fifth nerve comes into view.

No marked lesion exists here except a rather granular condition of the large motor cells forming the nucleus.

Higher than this, sections begin to disclose more serious lesions.

In the ascending branch of the fifth pair, there are few lesions except occasional over-distension of the blood-vessels and a few small areas of disintegration. In the course of the descending branch, and among the bladder-shaped cells from which it arises, many vacuoles appear.

In the locus cæruleus many excavations appear among the large, pigmented cells, and also where these cells merge, by losing their pigment and acquiring processes, into the motor nucleus of the fifth, occupying an anterior position.

In the course of these fibres emerging from and crossing the raphe from the opposite locus cæruleus, large vascular lesions exist. (See Fig 5).

Having passed the nucleus of the sixth and seventh sections begin to disclose more serious lesions. In the lower region of the trigeminus there begin to appear here and

there small and large cavities filled with a clear, colloid material. (Figs. 4 and 1).

These are visible to the naked eye, occupy the central motor region of the pons, and increase in number and size till the region of the fifth nerve is reached. They were over twenty in number, one of them being 5 mm. in its longer diameter.

This large vacuole lay in close proximity to the root of the fifth, as it passed from its nucleus forwards through the pons and still nearer the motor nucleus of the fifth.

Many of these large vacuoles lay just in front of, and some in the region of the pons occupied by the motor nucleus, and the scattered large cells giving origin to the motor root of the fifth.

These cavities were formed between the transverse bands (arciform fibres) which pass from the raphe outward, and did not destroy them, but put them on the stretch.

It is in these bands also, that the nuclear proliferation of the connective-tissue is most distinctly shown.

The raphe, too, here presents gross lesions chiefly of a vascular nature.

Higher in the pons the lesions were, vacuoles in the motor tract not going far enough back to implicate the nuclei of the third and fourth nerves, which were perfectly normal.

To summarize then, lesions of various magnitude and nature have been found in the tracts occupied by the trigeminus, part of the facial, spinal accessory and hypoglossal, while slight departures from the normal structure appear in the glosso-pharyngeal and pneumogastric tracts.

These lesions were, let it be understood, of a peculiar nature.

Take for example the lesions found in the whole hypoglossal tract. At no one point do we find the whole or a

large part of the nucleus destroyed, or the course of a great number of fibres interrupted, but throughout the entire tract we find lesions varying in severity from simple vascular engorgement, to areas of disintegration and vacuoles. These, moreover, are scattered here and there among the cells of the nucleus, (see Fig. 9), and along and across the course of the fibres, not causing the destruction of much nerve-tissue, but yet, by their topographical distribution and their proximity to important parts, rendered objects of suspicion.

With one exception the gross lesions were confined to the motor nerves. In the origin and course of the sensory root of the trigeminus many severe lesions were found.

The lesions are, moreover, of such a nature and distribution, that an excitation not an abolition of the functions of a nerve would most likely ensue.

Let it now be seen how far a correlation of lesions and symptoms will carry out this supposition.

In the first place the inflamed pia mater, surrounding the cord and including the anterior, posterior and spinal accessory nerve-roots, claims the attention.

Looking over the symptoms in the present case, those, which will strike the reader as possibly caused by this lesion, are pain and stiffness in the back of the neck, and as these are put down in all text-books as symptoms of cervical spinal meningitis, they can plainly be attributed in this case to the meningeal lesions above mentioned.

In the second place there have been demonstrated vascular and cavernous lesions in the whole spinal accessory tract and also inflamed pia mater about the spinal accessory roots.

The spinal accessory is a motor nerve. It innervates in whole or in part the constrictors of the pharynx, (through the glosso-pharyngeal and pneumogastric), the muscles of the larynx (through the pneumogastric), and, in conjunction

with the cervical nerves, the sterno-mastoid and trapezius.

The irritation of its centre and roots might be supposed to give rise to signs of irritation at its peripheral distribution.

What is there among the symptoms to point to this? On looking them over there are seen dysphagia, spasm of the sterno-mastoid and trapezius, and spasm of the glottis.

Dysphagia is due largely to spasm of the constrictors of the pharynx, while the other two are due to spasm of muscles almost wholly under spinal accessory control.

The unimportant lesions described as occurring in the pneumogastric and glosso-pharyngeal tracts may also have played a reflex part in the causation of spasm of the glottis and dysphagia.

In the third place the excited state of the hypoglossal nerve must find some outward manifestation.

It too, is a motor nerve, and besides the lingual, supplies other muscles brought into play in the first act of delutition.

The spasmodic action of these, too, finds its manifestation in the dysphagia.

The lesions in the lower facial nucleus now demand attention.

There is a well-known disease called labio-glosso-pharyngeal paralysis. In this disease there is developed, sometimes suddenly, more often slowly, paralysis of the muscles of the mouth, tongue and pharynx causing impaired articulation, and imperfect or impossible deglutition.

In this disease the lesion is found in that part of the medulla containing the hypoglossal, glosso-pharyngeal and lower facial nuclei.

The position of this lesion has led many observers to consider this nucleus the centre for the muscles of the mouth, which are the only facial muscles implicated in this disease.

Reasoning thus, and finding this nucleus and not the upper, the seat of lesion in the present case, one is not sur-

prised to find the muscles about the mouth in a state of excitement giving rise to the "*risus sardonius*."

The gross and minute lesions found in the pons are such as, by their direct action through the motor tract, and indirectly through the sensory origin of the fifth pair, would tend to keep that nerve in a state of perpetual excitement.

This excited state would be outwardly manifested by spasm of the muscles of mastication (temporals, pterygoids and masseters), and in this we see the trismus or lockjaw, the constant, and hitherto unexplained symptom of tetanus.

How much the implication of the respiratory centre in the medulla may have had to do with the Cheyne-Stokes' respiration is doubtful.

This peculiar breathing, although usually attributed to irritation or paresis of the respiratory centre in the medulla, may also be caused by peripheral irritation or impediment which occurred in this case in the form of œdema of the lungs.

The part which the irritated general vaso-motor centre in the medulla played in the causation of the fever is hard to say, but in it the septicæmic condition, present in this case, undoubtedly had its share.

The field, tempting in the extreme, of pathogeny and pathological physiology beckons the investigator on; but the task of the present paper is ended.

The character and location of the lesions in the present case have been pointed out.

An attempt has been made (how successfully the reader may judge) to find the outward expression of each lesion in a symptom, thus making the case typical.

It is earnestly hoped that this method may be more generally adopted, particular attention being paid by subse-

quent investigators to the medulla oblongata and pons varolii.

In closing, let an answer be given to those who will say, "If such lesions exist in every case, how is it that some recover?" The writer does not think that in non-fatal cases lesions as gross as occurred in the present case existed, but that in them the pathological change stopped one step short of the formation of large exudations and cavities, and was limited to vascular engorgements, perivascular dilatations and exudations, which, by their topographical distribution, were all-sufficient to cause the irritative symptoms occurring in cases of tetanus where recovery supervenes.

EXPLANATION OF PLATE.

Fig. 1. Transverse section of the pons varolii above the point of emergence of the trigeminus, and below the nuclei of the third and fourth nerves.

Showing the size and position of the vacuoles.

Semi-diagrammatic. Enlarged 2 diameters.

Fig. 2. From transverse section of upper cord. P. c.=Posterior column next the posterior root P. r. P. h.=tip of posterior horn of gray matter. L. c.=lateral column. P. m.=Pia mater with new material on its surface and new cells in its meshes, 120 diam.

Fig. 3. Granular, pigmented connective-tissue cells teased out of pia mater, more highly magnified, 750 diam.

Fig. 4. Cavity in the motor tract of the pons between the arciform fibres, a. f., and filled with slightly granular, colloid material, 120 diam.

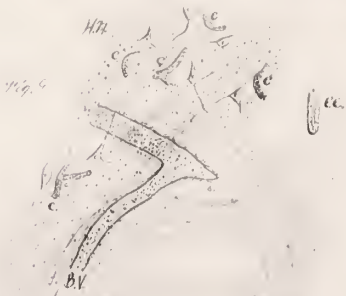
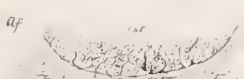
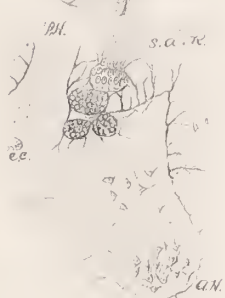
Fig. 5. Enlarged perivascular space with oblique section of enclosed blood-vessels. This lesion existed in the floor of the fourth ventricle where sensory fibres of fifth pair pass across raphe, (200 diam.).

Fig. 6. Enlarged from Fig. 7. A. h.=Ant. horn. P. h.=Post. horn. C. c.=Central canal. S. a. r.=Spinal accessory root, (120 diam.).

Fig. 7. Transverse section of upper cervical cord. Showing A. c.=Anterior columns; L. c.=Lateral columns, P. c.=Posterior columns. Spinal accessory tract enclosed in dotted lines. S. a. r.=Spinal accessory root, 10 diam.

Fig. 8. Trans. sect. central gray substance of upper cervical cord. C. c.=Central canal. A. f.=Anterior fissure. P. f.=Posterior fissure. A. c.=Anterior gray commissure. P. c.=Posterior gray commissure. A. h.=Anterior horn. P. h.=Posterior horn. C.=Enlarged perivascular space containing A.=Empty artery; V.=Engorged vein. Also other small vessels and large pigmented cells, same as in Figs. 2 and 3.

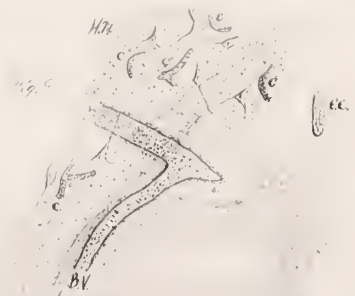
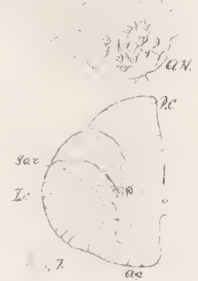
Fig. 9. Section of hypoglossal nucleus, H. n., low down. C. c.=Central canal. H. r.=Hypoglossal roots. R.=Raphe. B. v.=Stuffed blood-vessel and enlarged perivascular space in hypoglossal nucleus, crossing and accompanying the root-fibres. C.=Capillaries.



H.R. H.R. R.W.A. praepar. et del. R

Fig. 8. Trans. sect. central gray substance of upper cervical cord. C. c.=Central canal. A. f.=Anterior fissure. P. f.=Posterior fissure. A. c.=Anterior gray commissure. P. c.=Posterior gray commissure. A. h.=Anterior horn. P. h.=Posterior horn. C.=Enlarged perivascular space containing A.=Empty artery; V.=Engorged vein. Also other small vessels and large pigmented cells, same as in Figs. 2 and 3.

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R.W.A. praepr. et del. R

SULPHATE OF ESERINE IN THE TREATMENT OF
ACUTE GLAUCOMA.*

BY T. R. POOLEY, M. D.,
OF NEW YORK.

ABOUT two years ago, Prof. Laquener, of Strassburg, published the results of his experience in the use of the sulphate of eserine in the treatment of acute glaucoma. To him belongs the merit of the discovery of its "anti-glaucomatous" effects.

Since the publication of his paper, Wecker, Landesberg, Knapp and others have also written on the same subject. I have lately employed eserine in all the cases of glaucoma coming under my observation, and beg to offer the results of my experience, especially in acute glaucoma, to this Society. The publications which have hitherto been made are mainly to be found in the special journals of ophthalmology, and are therefore more or less inaccessible to the general practitioner.

Within the last year I have employed eserine in four cases of acute glaucoma. In two of them it was too late to expect any restoration to sight, as the disease had already progressed so far as to hopelessly compromise it—glaucoma absolutum—but as acute symptoms, circumcorneal in-

* Read before the Medical Society of the State of New York, at its seventy-third annual meeting, February 4, 1879.

jection and intense pain were still present, I classify them under this category.

I will briefly enumerate the history of these cases, and then offer some remarks upon them, with special reference to the indication for the use of this most valuable remedy.

CASE 1.—Mrs. G., of Saratoga, aged 71, came to consult me July 10th, in the absence of Dr. Knapp from the city. Three years ago she had an attack of acute glaucoma in the left eye, which ran its painful course unrecognized. Since that time she was totally blind on this side, but the eye was not painful. Last April she was suddenly seized with a severe pain in the right eye, which was also very much inflamed. She had a great deal of constitutional disturbance, and was under treatment for bilious fever, remaining in bed for three weeks. On account of the pain in the eye and dimness of vision, her physician called in an oculist, who made the diagnosis of immature cataract, and advised her to have it removed when it became ripe. But at the expiration of three or four weeks she was blind, and as the pain in the eye continued, she came to New York for advice. The left eye presented the typical appearance of absolute glaucoma. The pupil was wide and immovable, the lens cataractous, the globe hard, + T. 2, and all perception of light was gone, but the eye was quite free from pain or inflammatory symptoms. In the right eye there was still circumcorneal injection, fulness of the scleral veins, a wide, immovable pupil, + T. 3, deep excavation of the optic disc, the cornea anesthetic, and no perception of light. I ordered six leeches to the temple of right side, an aperient, a one per cent. solution of eserine, and advised an iridectomy for the relief of pain. About a week later, after the daily use of eserine in the meantime, she was admitted to the New York Ophthalmic and Aural Institute. The eserine had very materially diminished the pain, and the tension was lessened. The pupil was also now only middle-wide, but there was no restoration of sight. I made a broad iridectomy upwards. On cutting the iris the anterior chamber completely filled with blood. The blood absorbed in three days. Since the operation no pain; *Tn.* Discharged July 20, 1878. I heard from the patient once since her return home. The eye was again painful, but resort to the use of eserine soon freed her again from pain.

CASE 2.—John Connolly, aged 60, was admitted to the New

York Ophthalmic and Aural Institute June 27, 1878, He had several attacks of glaucoma in the right eye, which is perfectly blind. The eye was injected, pupil wide, immovable; anterior chamber almost gone, $+T. 2$, and no perception of light. Sclerotomy was made the same day to relieve his pain, with Graefe's knife. A single drop of vitreous escaped by opening the zonula, on account of a sudden movement of the patient, The following night he slept well; pain all gone, vitreous in wound. Eserine was used daily, and seemed to aid materially the closing of the wound. He was discharged July 1st. After leaving the hospital he had recurrences of pain in the eye, which was always relieved by the use of eserine. At each period of pain the eye was hard, but always regained normal tension under the use of eserine.

CASE 3.—Mary Fuchs, aged 50, admitted to the Institute Dec. 9, 1878. The right eye became affected only a day or two before admission. Counts fingers at six inches, anterior chamber shallow, pupil moderately wide. Field contracted on the nasal side and below; media hazy; inability to see the back-ground of the eye, $+T. 2$. She was given a one-half per cent. solution of eserine to instill in the eye every two hours; six leeches ordered to the temple, and a cathartic. The following day the anterior chamber was deeper, pupil somewhat contracted, tension reduced to $+T. 1$, and fingers were counted at ten feet. An upward iridectomy was now made, without accident, under ether. 11th.—No reaction; wound closed; eye free from pain. 12th.—Had pain in the left eye during the night; pupil dilated $+T. 1$; circumcorneal injection; rainbow colors around the light, $V. \frac{10}{200}$. Acute glaucoma diagnosed and eserine ordered, with leeches to temple. Eserine was instilled every two hours the following day, and on the 14th the eye was almost well; the pupil was contracted, $Tn.$, and the eyeball only slightly red. Nevertheless, it was thought to be safest to make an iridectomy, which was easily done, and resulted favorably. A few days later. the patient was discharged. A week later she came to the Dispensary, and her vision was found to be $\frac{20}{20}$ in the right and $\frac{20}{20}$ in the left eye. There was a large coloboma in both, normal tension, and ophthalmoscopy showed no excavation of the optic disc in either eye. In short a complete cure.

CASE 4.—Mrs. H., aged 65, a lady of wealth, and who had, with the exception of her eye trouble, always enjoyed good health, consulted me Dec. 26th, on account of an attack of acute glaucoma of the right eye. For the past few months, but especially since

last July, she had suffered from prodromic symptoms of glaucoma ; temporary obscuration of sight, rainbow colors around the light, and supraorbital neuralgia. She consulted an oculist last July, who found that she had incipient cataract in both eyes. The Sunday before coming to me she was awakened early in the morning with intense pain in and around the eye, which was found to be very much inflamed. When she came to my office I found the lids swollen, œdematous, chemosis of the ocular conjunctiva, circumcorneal injection, veins tortuous, cornea hazy, with central opacity, and insensible to the touch, pupil ad maximum dilated. Field of vision wanting above and to the inner side ; fingers could with difficulty be seen in the outer part of the field at six inches, +T. 2. No view of the interior could be obtained with the ophthalmoscope. The eye was very painful. The left eye had H. $\frac{1}{16}$, V. $\frac{2}{30}$, and showed no signs of glaucoma. I advised the use of eserine until the afternoon of the next day, and then iridectomy. A one per cent. solution of eserine was instilled every two hours, six leeches applied to the temple, and an aperient ordered. The following day, when I went to her residence to perform the operation, I was amazed at the change which had been made by the eserine. The eye was much less swollen and injected, the field of vision almost normal, fingers very readily seen at ten feet, and the pupil only middle wide. The anterior chamber was not very shallow.

Iridectomy was made under ether without any accident ; but when the point of the knife had but slightly entered the anterior chamber, I was struck by the resistance which the sclerotic afforded to its further progress ; it was almost like cutting through cartilage. Dec. 28th, the morning after the operation, there was some slight discharge on the lint and considerable serous chemosis, the lids were a little swollen, but there was not the slightest pain. The patient had enjoyed the best night's sleep for months. There was a good-sized coloboma, and no incarceration of the iris in the wound, which was closed, and the anterior chamber fully restored ; some blood in the pupil. From this time forward there was a favorable healing, although the eye remained hard for some time. At the end of two weeks the patient could go down stairs, and by the third week after the operation she drove out.

Jan. 27, 1879, just one month after the operation, I examined the eye at my office, and found V. $\frac{2}{30}$, with +16, while with +9 she reads Sn. 1½ quite fluently. The ophthalmoscope shows incipient cataract, and true excavation of the optic disc. The field of vision and tension normal.

I may mention here that at the time of operating upon the right eye, I made use of eserine in the healthy one as a prophylatic against the occurrence of glaucoma in it, as recommended by Wecker ; and I regret that this was not done also in the third case.

These four cases, but especially the last two,—the one affected with acute glaucoma in both eyes, the other in one,—illustrate the remarkable effect, which has already been published by others, of eserine in reducing intra-ocular pressure.

Indeed, the immediate good results obtained by the use of this drug at once raise the question, whether we might not depend upon it to the exclusion of iridectomy. But I only know of one case reported by Knapp, in which a cure of acute glaucoma was produced by eserine. It is not my purpose to discuss this question here. So far as we know at present, eserine cures acute glaucoma permanently in exceptional cases only. But its great value is that it produces a temporary improvement, by which the patient is beneficially prepared for an operation. It is for this reason that its actions should be more widely known. And my reason for bringing the attention of those present to this point is obvious.

The cases of blindness from unrecognized glaucoma,—thanks to the increased facilities for acquiring a knowledge of eye diseases, is steadily diminishing. But there are a number of practitioners who, although they are quite competent to make the diagnosis of acute glaucoma, do not care to assume the responsibility of making iridectomy for its cure. The operation is certainly difficult, and should be done by skilled hands.

In eserine, we have a remedy which can be used until the patient is able to reach an oculist, which not only prevents the destruction of the eye, that would otherwise ensue, but also, makes the conditions for performing the operation more favorable. It is with the hope of introducing the sulphate of eserine into practice under such circumstances, that this paper is presented.

ON THE CHORDA TYMPANI NERVE.

BY HORATIO R. BIGELOW, M. D.,
OF WASHINGTON, D. C.

DURING the spring and summer of 1875 I was employed in an anatomical and physiological investigation of the chorda tympani nerve in rabbits and dogs. While the results are not at all as satisfactory as I could wish them to be, owing to the difficulty of the minute dissection as well as to the embarrassment of noting impairment of the function of taste in lower animals, yet any experiments that tend to clear away doubt, or to establish theories in regard to the functions of the cranial nerves, will be of value to the generalizer of the future, who, from extensive data, will be able to draw inferences of reasonable probability. In the papers upon the Nervous System of the Human Body, read to the Royal Society, Sir Charles Bell writes: "From the nerve that comes off from the anterior ganglion of the leech, and which supplies its mouth, we may trace up through the gradations of animals a nerve of taste and manducation, until we arrive at the fifth or trigeminus in man. Here in the highest link, as in the lowest, the nerve is subservient to the same functions. It is the nerve of taste and of the salivary glands; of the muscles of the jaws and of common sensibility. This nerve comes

off from the base of the brain in so peculiar a situation that it alone, of all the nerves of the head, receives roots both from the column of sensibility and of motion. A ganglion is formed upon it near its origin, though some of its filaments pass on without entering into the ganglion. * * *

The nerve [portio dura of the 7th, portio dura nervi acustici, Sympatheticus of Winslow; Faciale of Vicq d' Azyr], passing into the internal auditory foramen, is here embraced by the *portio mollis*; but it separates from it and is received into an appropriate canal of the temporal bone. A little further on, and while within the temporal bone, two cords of communication are formed with the branches of the fifth nerve or trigeminus. One of these is called the vidian nerve and the other chorda tympani. By these communications nerves go in both directions; branches from the seventh are sent to the muscles at the back of the palate, while branches of the fifth nerve (and also of the sympathetic nerve) are brought into the interior of the ear. By the second of these communications, the chorda tympani [which joins the lingual branch of the fifth, just where that nerve is passing by the side of the levator and circumflexus palati] the branches of this respiratory nerve have access to the velum palati and its muscles."

Anatomy.—The clearest description that we have of the anatomy of the chorda tympani is that given by Sappey in his "Traité D'Anatomie Descriptive:"

"Plus volumineux et plus étendu que ceux qui précèdent [large petrosal, small petrosal and tympanic], ce rameau est surtout remarquable par son trajet d'abord rétrograde, par ses connexions avec la membrane du tympan, par la courbe parabolique qu'il décrit, et par sa terminaison exclusive dans un nerf éminemment sensitif. La corde du tympan se sépare du tronc du facial à 4 ou 5 millimètres au dessus du trou stylo-mastoidien, s'engage aussitôt dans un

conduit osseux particulier, se dirige en haut et en avant ; sort par un orifice situé sur la paroi postérieure de l'oreille moyenne immédiatement en dedans de la membrane du tympan ; pénètre alors dans l'épaisseur de cette membrane et la parcourt d'arrière en avant, à la manière d'une corde que sous-tendrait le tiers supérieur de sa circonférence. Elle chemine entre sa couche interne, et sa couche moyenne, et passe en dedans du manche du marteau. Arrivée à la paroi antérieure de l'oreille moyenne, la corde du tympan, ainsi que la très bien démontré M. Huguier, entre dans un nouveau conduit de 8 à 10 millimètres d'étendue parallèle et supérieur à la scissure de Glaser, sort de ce conduit au voisinage de l'épine du sphénoïde, et vient se réunir à angle aigu au nerf lingual, entre les deux ptérygoïdiens. L'origine et la terminaison de la corde du tympan sont encore un objet de contestation pour quelques anatomistes. Suivant Hippolyte Cloquet et Hirzel, ce rameau serait un prolongement du grand nerf pétreux superficiel, qui, parti du ganglion de Meckel, ne ferait qu'accoler au facial depuis le ganglion géniculé jusqu'au voisinage du trou stylo-mastoïdien, ou il serait restitué à son indépendance primitive sous le nom de *corde du tympan*. Pour M. Cusco, il émanerait de l'angle antérieur du ganglion géniculé et continuerait le nerf de Wrisberg, qui se trouverait aussi simplement accolé au tronc du facial. Ni l'une ni l'autre de ces opinions ne repose sur une observation exacte. La première est très nettement réfutée par les expériences de M. Prévost. La seconde est une simple hypothèse que l'observation repousse aussi ; comme tous les troncs nerveux, de faisceaux anastomosés, de telle sorte que lorsqu'un rameau s'en détache, il est tout à fait impossible de déterminer, parmi les divers faisceaux dont il se compose à son origine quel est celui qui lui donne naissance.

“ Relativement à la terminaison de la corde du tympan

plusieurs auteurs, et particulièrement M. Longet, admettent que ce nerf ne fait que s'appliquer au lingual; qu'arrivé au niveau du ganglion sous maxillaire, il s'en sépare pour former la racine motrice de ce ganglion. La dissection unie à l'emploi des réactifs démontre entre la corde du tympan et le lingual une fusion intime, complète *fibrille à fibrille* dans toute l'étendue de l'adossement de ces nerfs; à l'aide de ce procédé on tenterait donc vainement de reconnaître le mode de terminaison de la corde du tympan. Mais la méthode Wallerienne pourrait être appliquée à la solution de ce petit problème. M. Vulpian en arrachant le facial chez des chiens et des lapins, a pu constater qu'au bout de vingt jours tous les tubes nerveux formant la corde du tympan étaient dégénérés. Or, ces tubes dégénérés pouvaient être suivis dans le lingual jusqu'au ganglion sous maxillaire; au delà ils faisaient défaut. L'opinion de M. Longet était donc parfaitement fondée."

The difficulties attending a careful dissection of the chorda tympani are exceedingly great, and so repeated were my failures that I was tempted to resign further investigation. But a more delicate manipulation resulted from patience, and with the aid of a good magnifying lens and reagents, I succeeded in five cases, in satisfactorily following up the course of the nerve. It is not without a thorough appreciation of my own fallibility, not without a measure of diffidence that I venture an opinion somewhat at variance with that expressed by so learned a man as Prof. Sappey. My researches have led me to believe that the chorda tympani is not united "fibril to fibril" with the lingual, but is merely enclosed with it in a common sheath, and that the facial filaments come from the intermediary nerve of Wrisberg, and not from the main trunk. The gustatory nerves after passing to the anterior portion of the tongue divide dichotomously, these branches in turn subdi-

vide, and from these subdivisions there is formed quite a dense network. The terminal filaments of the gustatory nerves are expanded in the taste cells of the beakers, the bulbous expansion at the end being identical with the transparent neuclei. To me, there seems to be no doubt that the special sensory function of the facial filaments is derived from the nerve cells in the intumescencia gangliiformis found upon the nerve of Wrisberg in the aquæductus Fallopii. The chorda tympani sends branches to the lingual just after becoming joined to it in the common sheath between the pterygoid muscles. It is so well nigh impossible to separate these connecting filaments, and so closely opposed to each other are the two trunks, that I am perfectly aware of the unsatisfactory nature of the dissections, but yet, by means of the glass I was able to identify so many branches of the chorda tympani passing to the lingual, and so satisfactorily, for a considerable distance, demonstrated the integrity of each nerve, that I feel convinced that at no very distant day, it will be proven conclusively that these nerves are not joined "fibril to fibril," but that they pass together in one sheath, the lingual receiving branches from the chorda tympani, which in turn is made sensory through *the ganglion upon the nerve of Wrisberg.*

A CASE OF HYSTERICAL ANURIA CURED BY RESTORING A LACERATED CERVIX UTERI.*

BY DRs. T. A. McBRIDE AND M. D. MANN.

MRS. A., aged thirty-eight; mother of four children; family history decidedly neurotic. Was confined for the last time in the spring of 1874, and although having placenta prævia, was delivered of a living male child. Previous to this confinement had been under the care of the late Dr. Joseph Wooster for ulceration of the os uteri. For five years previous to birth of this child had suffered more or less from supra-orbital neuralgia of left side.

From loss of blood in the last confinement and exhaustion of the succeeding period of lactation, she became very anæmic, and in about a year and a half after the birth of the last child the following condition had developed:

Very marked anæmia; frequent attacks of occipital and vertex headaches; circulation poor, extremities and surface of body cold, pulse very feeble and small; dyspnœa on slightest exertion; increase in deposit of adipose tissue; anæsthesia of the left side with analgesia of the right; the clavus, globus, pain in left vertebral groove, and in præcordia, and in left ovarian region were usually present.

In November, 1875, she was attacked with very severe

* Read by Dr. Mann before the Northwestern Medical and Surgical Society of N. Y., March 19, 1879.

occipital headache which soon became generalized, though much more severe in occipital region. This pain was unbearable. It was then observed that she was voiding no urine. A catheter was passed, and a tablespoonful or so of the urine was obtained, but from this time forward, for a period of one hundred and eight hours, not a drop of urine was secreted. For the first day and a half of this time, she complained mainly of the severe pain in her head, and the usual amount of backache. Soon, however, her condition became much changed; persistent nausea appeared which was accompanied by uncontrollable vomiting; her features became wan and pinched, the eyes deeply sunken and surrounded by wide black circles; about the mouth there was a marked pallor, which was in striking contrast to the dusky appearance of the face elsewhere; the whole surface of the body was more or less dusky; the tongue was moist, but of this same dusky appearance; the pulse could be felt and that was all, it was so small and thready; the surface of the body and the extremities were very cold; the thermometer in the mouth indexed 35.6° (96° F.); consciousness was not impaired, and with it all there was great restlessness. The pain in the head continued with unremitting severity, and the patient had not slept since the beginning of the attack. A hot air bath was tried and provoked a syncopal attack. Dry cups over the kidneys were applied with no effect. The actual cautery—platinum tipped—was then used with no result. Meanwhile, the whole gamut of diuretics was gone through, from digitalis to apocynum cannabinum, and from squill to oil of juniper by inhalation, and with no effect. The hydragogue cathartics were next invoked, and from a large dose of the *pulvis purgans* a slight amelioration of the symptoms was observed. This and other hydragogues were used at different times but the condition of the patient remained the same. Nitrite of amyl by inhalation produced

no change in her condition. Rectal injections of hot water, milk of assafœtida were also tried with no effect. The pain in the head having increased, and the patient begging for relief, a hypodermic injection of twenty minims of Magendie's solution of bimeconate of morphia was administered, with very marked relief of the pain. A few hours afterward another injection of thirty minims was given, and a short time after this last injection some urine was secreted. Another hypodermic injection of the same amount was given again in a few hours, and more urine was secreted. In thirty-six hours the kidneys were acting naturally and secreting the usual amount of urine. There was at no time any urinous or ammoniacal smell about the patient's body or in her breath.

An examination of the vomited matter showed the presence of some urea. The urine which was first secreted contained great quantities of urea, and was of high specific gravity.

Microscopical examination of the urine first passed showed nothing abnormal, and repeated examinations extending over a period of a year, failed to detect any evidence of renal disease.

After this attack the patient was placed on tonics and preparations of iron, etc., but from this time on to February 19, 1878, these attacks of suppression of urine would recur. At first they came at irregular intervals. She would observe that an occipital headache was coming on, and then would remember that she had not secreted any urine for some time. After a while she came to look for the occurrence of these attacks just before her menstrual periods. The duration of these attacks would be from sixty to ninety hours, the average being sixty. They were never so severe as the first attack, for the reason probably that she would receive a hypodermic injection of bimeconate of morphia

as soon as possible, and this would check the attack sometimes at once, and sometimes only after it had been repeated several times. This was the only remedy which seemed to have any effect in restoring the secretion of urine. The symptoms were usually the severe occipital headache, nausea, vomiting, great restlessness and sleeplessness, and great coldness of the whole body and very feeble heart action.

I was soon convinced that these attacks depended upon some uterine trouble, although she had very few symptoms of uterine disease, except pain in the back and leucorrhœa. I therefore placed her in the hands of Dr. Mann for special treatment.

The first authentic description of hysterical anuria is to be found in "A Treatise on Diseases of Women," by Dr. T. Laycock, Professor in the University of Edinburgh, which was published in 1840.

In "Leçons sur les Maladies du Système Nerveux faites à la Salpêtrière," 1872 and 1873, Charcot gives an extended account, with a case,

In *L'Union Médicale*, April, 1873, and abstracted in *Medico-Chirurgical Review*, Vol. LII, 1873, M. Ch. Fernet reports a case.

In the *British Medical Journal*, Dec. 21, 1878, there is a brief notice of a case of hysteria with complete anuria, reported by Dr. Vinet in the *Nicc Médical*.

In his "Leçons sur l'Appareil Vaso-Moteur," Paris, 1875, Vol. I, page 555, Vulpian explains the course of hysterical anuria as the result of reflex action through the splanchnic nerves. If these nerves be faradised the kidneys become pale and anæmic from contraction of the blood-vessels, and no urine is secreted.

The case of Mrs. A. differs in some respects from those reported by Laycock, Charcot and Fernet, in that the constitutional symptoms were more marked.

[McB.]

Mrs. A. was referred to me by Dr. McBride in December, 1873. Besides the attacks of anuria already described, she complained of pain in the back, aggravated by going up or down stairs; constant dragging pains in the pelvis; profuse leucorrhœa, and almost entire inability to walk. Menstruation was regular and pretty free.

An examination showed the perineum to be ruptured nearly down to the sphincter ani, and the vagina very much relaxed. The uterus was low in the pelvis, retroverted in the second degree, and considerably enlarged, the sound passing in 9 centimetres. There was also a moderate amount of congestion, and a little tenderness of the endometrium. The cervix was enlarged, and a plug of tenacious mucus hung from the canal. The os was large, easily admitting the finger for nearly 3 centimetres, and all around its edge there was a considerable line erosion which bled on touch. The neck was in fact lacerated, although this was not at the time fully appreciated, the laceration being bilateral, but not extending all the way through the sides of the cervix. There was no special tendency to prolapse of the mucous membrane, and the erosion was limited in extent, so that it was very easy to overlook the importance of the cervical tear. The subject had only a short time previously been brought prominently before the profession, and the etiological relations of the lesser forms of laceration, especially those which did not extend completely through the cervical walls, were not then very generally recognized.

I proposed in the way of treatment that a pessary should be introduced to keep up the heavy organ, which was accordingly done, though considerable trouble was experienced in getting one broad enough to stay in. The patient was also ordered to use hot water irrigations, and applications were made to the canal, first of a solution of nitrate of silver, 1 to 12, and then of a strong tincture of iodine.

Tampons of cotton, saturated with glycerite of tannin were also used. An operation to restore the perineum was proposed but rejected. Under this treatment combined with general tonics ordered by Dr. McBride, the patient made considerable improvement. The discharge grew less, the backache and dragging pains in the pelvis nearly disappeared, and she was enabled to walk a moderate distance without great fatigue.

Soon afterwards the patient left town and I did not see her again, to resume treatment, until January, 1877. During this interval she reports that she did not suffer as much from the symptoms directly referable to the uterus, but that the troubles at the time of the periods, the headache, anuria, etc., were if anything worse. She still used the pessary, without which she felt that she could not get along at all. An examination at this time showed that matters were as bad or worse than ever. The uterus was not at all reduced in size, and although it had been held up in its place for so long a time, still the natural supports had not regained their tonicity in the least, and the moment the pessary was removed it toppled over just as it previously had done.

The cervical canal was as large as before, and the os still more gaping, and was surrounded by a wider border of erosion, part of which was covered by a layer of granulation tissue.

The true condition of the cervix having at this time been recognized, an operation was proposed and insisted upon as affording the only chance of relief. Consent was gained, but from some domestic reasons the operation was deferred for more than a year.

The condition of the patient at the time of the operation was wretched in the extreme; the suffering at the menstrual periods was very great, and the recovery was so slow that two weeks out of every month were spent in bed.

Previous to the operation hot water irrigations were ordered twice daily, and the recumbent posture to be maintained as much as possible.

The operation was performed February 19, 1878, with the assistance of Drs. McBride and P. F. Mundé. A portion on each side of the cervix being denuded, the parts were brought together by eight silver wire sutures in the usual way. The patient was then put to bed, and quickly recovered from the effects of the ether. A few hours after the operation, in the evening, a large quantity of clear limpid urine, of a low specific gravity, was passed. No urine was passed during the night, and but a very small quantity on the following day, and for the next three days none at all. As at the end of this time the patient was beginning to feel very much the stoppage of the urinary secretion, showing it in the usual way, by intense pallor and severe headache, I determined to remove the stitches, thinking that perhaps the irritation of the wire in the uterine tissues was acting on the kidneys. I therefore removed the stitches at the beginning of the fifth day, and found the parts to be perfectly united. The next day the kidneys began to act, and in the course of two or three days were restored to perfect functional activity. The patient made a slow recovery, but in the course of two months had so far regained her strength that she reported herself as better than she had been in years. Nearly all the old symptoms had gone, and she felt like a new woman.

In May the menses, which had been regular since the operation, ceased, and she began to manifest symptoms of pregnancy.

In August she was taken with severe uterine flooding, which continued for more than two weeks. I saw her towards the end of that time, when the flow had nearly ceased. It returned again, however, and on August 21st I

delivered her of a three months' foetus, which had evidently been dead for some time. Immediately after the abortion the kidneys stopped work for a day, but soon recovered, and have never ceased to properly perform their functions up to the present time.

After recovering from the miscarriage, the patient's health slowly improved, and she now reports that, except for a severe headache preceding the period, and lasting for one or two days, she is in perfect health.

An examination made at a recent date shows the uterus to be in place and of natural size, the sound passing in only seven centimetres. The os is about two centimetres in length; there is no erosion, or more than the normal secretion. The vagina is much reduced in size, and as there is no tendency to the production of a cystocele or rectocele, all thoughts of further operative procedures are given up.

This case certainly illustrates the great benefit which may result from restoring a lacerated cervix. That the anuria was dependent on the condition of the neck of the uterus can scarcely be doubted. Constitutional treatment was long and faithfully tried, but without result. The ordinary uterine treatment by pessary, applications, hot-water irrigations, glycerine, astringents, etc., was given a fair and full trial, but only resulted in relief of some of the less troublesome symptoms. The point of irritation was doubtless the eroded and sensitive cervix, the irritation being propagated through the nervous system, and resulting in an inhibitory action on the kidneys. To remove this point of irritation, to allow of the restoration of the parts to their normal condition, but one way remained, and that was to restore the normal anatomical relation of the parts, so that only that portion of mucous membrane should be exposed to the natural friction of the vagina which was by nature intended for that purpose. The application of powerful

caustics to the parts, by causing cicatricial contraction, might possibly have accomplished the same end, but that method of treatment is certainly not surgical, and in this case, particularly, the risk would have been run of entangling nerve filaments in the cicatricial contraction, and of thus keeping up the irritation in a permanent way, and in a way which would have been much more difficult to relieve. Cases like this are strong arguments in favor of Dr. Emmet's operation, and constitute facts which opponents of the operation should well consider.

[M. D. M.]

ELEMENTARY LESSONS IN ELECTRICITY.

III.

By A. FLOYD DELAFIED, A. B.

IN the preceding paper I showed how the electro-motive force of a galvanic cell is measured by means of the attractions and repulsions of light bodies, exactly as the electro-motive force produced by friction is measured. I also briefly described the principal forms of galvanic cells now in use.

It must be noted that in all cells in which zinc is placed in dilute sulphuric acid or dichromate of potassium mixture it is necessary to amalgamate the zinc. It is a singular fact that amalgamated zinc is not acted on by these liquids except when a current is passing.

Battery zincs may be amalgamated in various ways. One is to dip them in dilute sulphuric or hydrochloric acid, and then either to dip them into mercury or pour or rub mercury on them.

Another plan is to dip them into a solution made thus : Dissolve 8 oz. mercury in 1 lb. nitric, and 2 lbs. hydrochloric acid. When the mercury is dissolved, add 3 lbs. hydrochloric acid. The acids are all undiluted. The zincs are dipped into this solution for a few seconds, and then at once rinsed with water. When thirty or forty zincs are to be amalgamated, this is the most speedy and effectual plan.

Whatever plan be used it is nearly always necessary to amalgamate new zincs more than once.

In batteries where the zinc is placed in sulphate of zinc, it should never be amalgamated.

VII.—We have thus far only considered the electro-motive force produced by mechanical and chemical apparatus, and have found that this force does not depend on the size of the apparatus, but on the nature of the materials employed. This electro-motive force is something quite independent of the quantity of electricity developed; in fact, I have already stated that, while the electro-motive force produced by frictional machines is vastly greater than that produced by galvanic batteries, these utilize a much greater amount of work than the former. In other words, the frictional machines produce a minute quantity of electricity at a very high potential, and the galvanic apparatus produces a large amount of electricity at a low potential.

In order to get a considerable quantity of electricity from the frictional machine, we must grind it for some time and accumulate the electricity in a Leyden jar or some other receiver of great capacity. On discharging the receiver a considerable current flows, but it is only momentary, and then the jar must be charged afresh, so that such an arrangement is quite unsuitable for producing a continuous current. For this purpose we therefore employ the galvanic battery, and it is very important to be able to measure the strength of the current thus produced, and to choose the batteries for any given purpose. In treating of these subjects it is convenient to use some terms which may as well be defined here.

Circuit.—A system of wires, batteries, instruments, and conductors, any or all of these, through which a current passes.

Closing Circuit.—Making connection so that the current can pass.

Opening Circuit.—Breaking connection in one or more places so that the current cannot pass.

Strength of a Current.—The quantity of electricity which passes a given point of a circuit in a second.

The strength of a current is found to be proportional to the electro-motive force employed, but is diminished in exact proportion to the resistance offered by the circuit.

To find then the strength of the current through any circuit, we have only to measure the electro-motive force of the battery and the total resistance of the circuit. The strength of the current will then be equal to the electro-motive force divided by the resistance of the circuit, both being expressed in the proper units. This is Ohm's law.

It is therefore necessary to measure the resistance of all portions of a circuit to know the strength of a current passing through it. The resistances of conducting wires, instruments, the human body, etc., are found by comparing them with those of wires of standard material, length and thickness, just as we find the weight of a piece of butter by comparing it with that of certain pieces of metal of known weight, called pounds and ounces. The resistance of batteries is found by more complicated methods based on the same principle, and follows exactly the same laws.

If we examine a few imaginary circuits, we shall see that the relative importance of the resistances of their different parts will determine their best arrangement.

For instance, suppose we wish to heat a small piece of platinum wire whose resistance when heated is 1.5 ohms. The heat developed will be greatest when the current is strongest. Suppose we use ten cells of gravity battery, each cell having an electro-motive force of one volt and a resistance of two ohms. Connecting the cells in series, as it is called, that is, the zinc of one cell to the copper of the next, the electro-motive force of the whole battery will be

$10 \times 1 = 10$ volts and its resistance $10 \times 2 = 20$ ohms. Then the current will be $\frac{10 \text{ volts}}{1.5 \text{ ohms} + 20 \text{ ohms}} = \frac{2 \text{ volts}}{4.3 \text{ ohms}}$

If for the gravity batteries we substitute two dipping batteries, each with an electro-motive force of 2 volts and a resistance of .25 ohm, and connect them with the same platinum wire, we shall have current $= \frac{4 \text{ volts}}{1.5 + .5 \text{ ohms}} = \frac{2 \text{ volts}}{1 \text{ ohm}}$ or 4.3 times as strong a current as before.

Supposing, however, that instead of a short wire we place the human body in circuit, whose resistance is about 8,000 ohms. We shall have then with the 10 gravity cells,

$$\text{Current} = \frac{10 \text{ volts}}{8,000 + 20 \text{ ohms}} = \frac{1 \text{ volt}}{802 \text{ ohms}}$$

and with the dipping batteries,

$$\text{Current} = \frac{4 \text{ volts}}{8,000 + .5 \text{ ohms}} = \frac{1 \text{ volt}}{2,000.1 \text{ ohms}}$$

In this case we get nearly $2\frac{1}{2}$ times as great a quantity of electricity from the gravity cells as from the dipping cells, while with only the wire in circuit we got less than one quarter as much.

We may say then, if there is but little resistance to be overcome, adding electro-motive force is of little advantage, and the current will be strengthened by diminishing the resistance of the battery.

If the circuit include a very large resistance such as the human body or a long coil of very thin wire, the resistance of the battery is of trifling importance, and the current is strengthened by increasing the electro-motive force.

In what then consists the resistance of a galvanic cell?

VIII.—The resistance of a galvanic cell depends upon,

1. The material of the plates,
2. Their size and distance apart,
3. The liquid or liquids used,
4. The temperature.

1. The resistance of the plates is inconsiderable except in the case of carbon, where it is quite large.

2. The size of the plates determines the cross-section of the column of liquid between them, and their distance apart its length.*

3. Liquids differ vastly in conducting-power, and the choice of liquids is therefore important.

4. The resistance of liquids and carbon decreases rapidly with the elevation of temperature.

In a galvanic cell of low resistance we must therefore use large plates, that the cross-section of the liquid between them may be large, and put them close together, that the current may have only a short distance to pass through the liquid ; for the best liquid conductors offer many thousand times the resistance that metals do. We must also choose a liquid or liquids of lowest possible resistance, and keep the whole cell at the highest temperature consistent with convenience.

This latter point requires no attention on our part, as, in circuits of very low resistance, the batteries become much heated by the passage of the current.

In batteries of very low resistance the action is so energetic, that even if they be made quite large, the liquids are rapidly exhausted. It is therefore usual to make them small for the sake of portability, and fill them afresh whenever they are used.

Where low resistance is of little consequence and a battery is needed that will work for months without attention, it is better to have a large amount of liquid in proportion to the size of the plates, and to use solutions which are kept fresh by a supply of the proper salt placed in the battery when it is set up. The cell must also be covered to prevent evaporation.

* The distance between the plates is called the length of the column of liquid, because the current flows from one plate to the other, and not up and down.

The batteries in ordinary use may be classed as follows, beginning with the best under each head.

Low Resistance.	High Electro-motive force.	Constancy.	Little trouble for short use.	Little trouble for long use.
Grove,	Dipping,	Gravity,	Dipping,	} Lecian. hé } Gravity, } Daniell,
Dipping,	Bunsen,	Daniell,	Grove,	
Bunsen,	Grove,	Grove,	Bunsen,	
Gravity (very large)	Leclanché,	Bunsen.		

No battery has yet been invented which is convenient for all purposes, and opinions will differ as to the correctness of this or any other classification.

In some cases the same battery may be used for more than one purpose if the cells are properly connected.

Take for example two gravity cells each of 1 volt electro-motive force and 2 ohms resistance. If the zinc of one cell be connected with the copper of the next, the electro-motive and resistance of the two cells will each be twice that of one cell.

If, however, the zincs of the two cells be connected together and also the coppers, we shall have what amounts to one battery twice as large as one of the cells, with the electro-motive force of one cell, and half the resistance of one.

We shall have then, in the first case, a battery of 2 volts and 4 ohms, and the second case one of 1 volt and 1 ohm.

This plan of different connections can be carried out with any number of cells; it is, however, but seldom that any advantage can result from the proceeding, except for experiment. Suppose we wish to heat a platinum wire whose resistance when white hot is .6 ohm. Using two Grove cells each of resistance $\frac{1}{8}$ ohm, and electro-motive force 2 volts, we shall have

$$\text{Current} = \frac{2 \times 2}{.6 + 2 \times \frac{1}{8}} = \frac{4}{.85}$$

To produce through the same wire an equal current by means of gravity batteries would take no less than 128 cells in four groups of 32 each, if each had electro-motive of 1 volt and resistance of 2 ohms.

$$\text{Current} = \frac{4 \times 1}{.6 + 4 \times \frac{2}{32}} = \frac{4}{.85}$$

Such an arrangement would be absurd. No one would think of using 128 gravity batteries, connected so as to be useless for any other purpose, to do the work of two Groves which can be set up in five minutes.

For circuits of small resistance dipping batteries are much used instead of Grove's, as they have no smell. The galvanocautery batteries of Piffard and Byrne are dipping batteries arranged to have as low a resistance as possible. They have besides absence of odor, the advantage that the plates can be lifted from the liquid when they are not in use.

Such batteries give a current of rapidly decreasing strength, and the liquid is exhausted very soon. They are useless for any purpose except the particular one for which they were designed.

As to batteries which last for months without any attention whatever, the Leclanché and Gravity are the favorites. The Leclanché has a greater electro-motive force than the Gravity, but also a greater resistance. In circuits of small resistance, the Leclanché is much inferior to the Gravity, as its power decreases rapidly as soon as the circuit is closed, while the Gravity keeps up a steady current for months through any resistance, small or large. In circuits of large resistance however, there is but little difference between the two cells. In respect to convenience there is hardly any choice. The Leclanché batteries last about a year without attention, if the circuit is only closed a few times a day for a short time, and the Gravity cells will do the same, if they are properly designed, well covered and well supplied with sulphate of copper at the start.

EDITORIAL DEPARTMENT.

NOTES ON OBSTETRIC PRACTICE IN SIAM.

By SAMUEL R. HOUSE, M.D.

The Siamese Twins, on one of their tours of exhibition through the country many years ago, paid a visit to the Hartford Asylum for the Deaf and Dumb. The writer not long after, visiting the institution, was introduced to the pupils as a medical missionary about returning to his work in Siam. While all seemed to comprehend where he was going and on what errand, one bright-looking lad was observed to talk very earnestly in the sign language to his instructor, ending all by putting his two thumbs together very significantly. The only response from his teacher, himself a mute, was an immoderate fit of laughter. When he could command himself sufficiently, he wrote on a slate "the boy asks whether all the people in Siam are born twins?" He had simply made too broad a generalization, though the old motto reads, '*ab uno disce omnes.*' Still, how people come into the world in that remote land, is a subject that may prove not without interest even to medical men.

Obstetric practice in Siam as will be conjectured, is of the rudest kind. Were all left to unassisted nature, mother and child might fare better, but not a little "meddlesome midwifery" is resorted to, and one strange custom is universally prevalent, as abhorrent to good sense as it is to humanity.

Elderly women are their chief dependence on these occasions,

and they are as officious and as wise in their own conceit as "experienced nurses" in more civilized communities are apt to be. Male practitioners are summoned only in exceptional cases. Utterly ignorant as these are of anatomy and of the nature of the process of parturition, and holding as they do that all delays and obstructions are caused by demoniacal interference, their practice consists much of it in incantations and exorcisms and in rudest methods to hasten expulsion. A favorite way to expedite matters is to press with great force on the abdomen and its contents,—shampooing vigorously with thumbs and fists. They even stand with bare feet upon the poor woman's body, crowding the heel upon the front or sides of the distended uterus, and all without the slightest reference to, or knowledge of the condition of the os uteri. The writer has seen a large psoas abscess produced by the violence used on such an occasion.

Is the patient feverish and restless? the doctor fills her mouth with perfumed water over which a charm has been muttered, and spritzes it dexterously in a fine and not unrefreshing spray, over the all but naked body of the sufferer;—bidding at the same time the evil spirit to begone. If the same peremptory order were given to the many sympathising female friends who crowd the little room and keep up a loud and incessant chattering, more good might result.

Does the labor still prove tedious? a large brass bowl is procured, a long wax taper is lighted and fastened in the bottom of it by a few drops of the melted wax, silver coins to the amount of ninety cents (which are to revert to the doctor as the invariable fee for this service) are stuck on the sides of the candle, and the bowl is filled up with uncooked rice—on which some coarse salt, dried peppers, etc., are thrown, and over this, with hands laid palm to palm and bowed head, an incantation is addressed to the invisible powers which have control over the malicious demons that are hindering the birth of the child.

Meanwhile, for any bad symptoms that may arise, medicines are administered in accordance with their simple theory of pathology and therapeutics, that all disturbances of the system are produced

by undue preponderance of one of the four elements—fire, wind, earth or water. As a specimen of their prescriptions, the following may answer. It was made by the Court physician in the presence of the writer, for a lady of high rank, at the time of her confinement. Rub together shavings of sapan wood, rhinoceros' blood, tiger's milk (a white deposit found on certain leaves in the forests), and the cast-off skins of spiders.

But at last the delivery is accomplished. Then a scene of confusion begins; one rushes out for salt, another for warm water and an earthen basin to wash the child, a third with frantic haste brings for the mother's comfort an earthen tray full of firebrands, snatched up from the kitchen-fire, which soon fill the room with a blinding smoke. Meanwhile, a piece of split bamboo is looked up, from which a rude knife is fashioned, and with this the umbilical cord is cut or rather sawed through, for with nothing metallic may the cord be severed under any circumstances. Since they never tie the cord, this is not bad practice as by it liability to bleeding is prevented. An old earthen jar is now found to receive the placenta, which with two or three handfuls of coarse salt thrown upon it is then buried somewhere in the garden, averting thus evil that would otherwise befall mother and child.

Next the child is washed and laid on a soft pillow, around which to protect from drafts and mosquitos, a close curtain is extemporized by using the three yard piece of printed muslin that constitutes a Siamese dress. From the very first day, babes in Siam are fed with honey and rice water, and have the soft pulp of bananas crammed into their little mouths.

And now with the mother begins a month of penance, exposure to true purgatorial fires. It is inground into the native female mind in Siam, that the most direful consequences to both mother and child will ensue, unless for thirty days after the birth of her first child (a period diminished five days at each subsequent birth) she expose her naked abdomen and back to the heat of a blazing fire, not two feet distant from her, kept up incessantly day and night.

From this curious Siamese custom of "lying by the fire," this cruel addition to the unavoidable trials of woman in childbirth, none in palace or bamboo hut dare to exempt themselves. No superstition has greater hold upon them or more terrifies them with fear of coming evil if they fail to comply with it.

And their medical science bolsters up the custom, by teaching that after the birth of the child there is always a diminution of the fire element in the system tending to produce stagnation, a flabby state of the uterus, bad humors in the blood, a bad quality of the milk and other unknown and terrible dangers to parent and offspring, from which this free external application of heat alone can deliver them. They think, too, the due quantity, quality and proper duration of the lochial discharge depends on this exposure to the fire. Vain is it to tell them of the mothers in other countries who receive no detriment from their dispensing with such a usage. They are sure *Siamese* women require it, and they confirm their faith in this practice by pointing to the wives of European residents, who, it must be confessed, owing, of course, to the prostrating heat of that tropical climate, do not generally rally very well after child-bearing.

The manner of conducting this slow self-torture is as follows : A fire-place is brought in, or extemporized on the floor of the lying-in chamber by having a flat box or a simple rectangular framework of plank or trunks of banana trees, some three feet by four, filled in with earth to the depth of six inches. On this the fire is built with sticks of wood nearly or quite as large as one's wrist. By the side of this oblong frame and in contact with it, raised to the level of the fire, a piece of board six or seven feet in length is placed, and on a coarse mat spread upon this, or on the bare plank itself, the unfortunate woman lies, with bare back and limbs, quite nude indeed, save a narrow strip of cloth about her hips, with nothing else to screen her from a fire hot enough to roast a duck. There, acting as her own turnspit, she exposes front and back to this excessive heat ; an experience not to be coveted in any land, but in that burning clime of perpetual summer, a fiery trial indeed.

The husband or nurse is ever hard by, like her evil genius, to stir up and replenish the fire by night and by day. True, if it blazes up too fiercely for flesh and blood to endure, there is at hand a basin containing water, and a small mop with which to sprinkle it on the flames and keep them in check. For the escape of the smoke no provision is made, for chimneys are unknown in Siamese kitchens even. It ought to be added that hot water alone is allowed to quench the patient's thirst.

Of all the strange customs of that strange people, the writer, during his thirty years' sojourn among them, found none more barbarous—more unreasonable. He well remembers the honest indignation he felt when first he witnessed it, and learned the obstinacy of their senseless prejudices respecting it. He had been sent for to treat a woman suffering with inflammation of the breast, and found the poor creature, though in a high fever, lying so near a hot fire, made with half a dozen blazing firebrands, that his face was fairly scorched as he approached her to note the pulse, while the smoke that filled the close apartment blinded his eyes. At another time, visiting a native lady of lighter complexion than usual, who had been some days exposed to this treatment, he was startled with the appearance of the surface of the abdomen, which resembled that of a porker just roasted, and done, too, to a crisp. This encrustation proved to be, however, an eczematous eruption, produced of course by the extreme heat. On another occasion, called to see a woman who "*u fai mai dai*" (could not endure the fire), she was found, with burning skin and bounding pulse, so near a furious fire that her back had become so hot that the hand could hardly bear it. All remonstrances with her three female tormentors proving vain, and declining to treat the patient unless the fire was at once removed, he left. The next morning, curious to watch the case, he called again, but finding all cleared up, no vestige of fireplace or fire or patient either, he thought at first he had mistaken the house. On inquiry he learned, what was not very strange, that the subject of this high-pressure treatment had had a fit, foamed at the mouth, and died and was already buried. *Buried*, because those whose lack of merit causes them

to die in child-birth are *buried*, not cremated, as is the rule with nearly all others who die in Siam.

When and with whom this truly heathenish practice originated is unknown, but it is a custom universal in that land, and probably throughout the entire peninsula of Indo-China, for the women of all the various races resident at Bangkok, not only the Siamese, but the Laos, the Burmese, the Peguans, Malays, Anamites and Cambodians practice it. The women of this last race, indeed, improve upon the discomfort experienced by those of other nationalities, for they plant their couch of repose, the bench of bamboo slats on which they lie, not alongside of, but actually directly *over* the fire, so that the smoke and heat ascending can do their full work, and they see their thirty days and nights drag slowly along, broiling on this Montezuma bed of misery. Cambodia, once the leading nation of Farther India, as its recently discovered wonderful ruins of stone palaces and temples attest, has been nearly depopulated. Need we wonder when such an atrocious attack upon the life of its inhabitants at the very fountain head has been going on so long?

His late Majesty, Maha Mongkut, the enlightened father of the intelligent young King now on the throne, admitted the superiority of our Western obstetric practice, and would gladly have abolished this absurd and injurious custom of his people. When he succeeded to the throne in 1851, after spending twenty-seven years in the celibacy required of the Buddhist priesthood, and children began to be born to him in his well-stocked harem, he made some attempts in this direction. Upon the birth of the first of the eighty-one children begotten by him during his seventeen years' reign, the writer was summoned, in consultation with an older medical missionary, to the royal palace.

As that was the first occasion when a foreign physician was ever admitted within the forbidden precincts of the royal harem, a detailed account of it may prove of interest. Dr. Bradley had been sent for in the morning, and found the lady, who had given birth to a princess five days before, doing the usual penance of lying before a hot fire on a hard board, with the win-

dow shutters of the apartment all closed, suffering from fever greatly aggravated by the heat and smoke. Representing the urgency of the case to his Majesty, he obtained prompt and full permission to treat the patient as he thought proper.

The fire was at once of course removed, the window-shutters thrown open, the patient transferred to a comfortable mattress and cool water freely used with some simple medicinal treatment. On Dr. B.'s return to the palace in the evening, the writer at the King's request accompanied him. Passing the guard at the outer gate, at the inner a parley ensued, the gate was then unlocked and women attendants with torches took us in charge, one going before, another to prevent straggling bringing up the rear. The torch-glare showed us we were now in quite a well-built town, with paved streets, grand halls, a bazaar, a temple and many separate tiled-roof dwellings, gardens and tanks.

Turning several corners, we came at last to the substantial brick residence of the lady patient. Admitted to her apartments we found a white canopy suspended from the centre of the ceiling, under which the young princess was slumbering on a more elevated couch than the mother, in whose veins flowed no royal blood. All around the room, as in all Siamese houses at such times, a cotton yarn was stretched to which were fastened papers bearing cabalistic figures, one for each of the four walls, to keep off evil spirits from the mother and child.

The patient was doing well, and out of danger evidently. At eleven o'clock the chief of the Royal Physicians joined us, a prince, half brother to the King. After another visit to the patient's apartments and finding everything as favorable as we could wish, about midnight we proposed going home. "Oh! going home is out of the question," said the prince-doctor. "How will you get out? the gates are locked and sealed and the keys are sent in to King. Happen what will you cannot get out now," and so we made the best of it till morning, sleeping some and talking more. But it was a strange place for foreign physicians to pass the night, and know that 3,000 women, and women only, were slumbering around them. And it was an unprecedented event too, in the history of the kingdom.

In a few days convalescence was established and a messenger came to Dr. B. from the King, bearing a purse of silver and an autograph note in the King's peculiar English, which is worth transcribing.

ROYAL HALL.

MY DEAR SIR :

My mind is indeed full of much gratitude to you for your skill and some expense of medicine in most valuable favor to my dear lady, the mother of my little infant daughter, by saving her life from approaching death.

I cannot hesitate longer than perceiving that she was undoubtedly saved.

I beg therefore your kind acceptance of 200 ticals for Dr. D. B. Bradley who was the curer of her, and 40 ticals for Dr. S. R. House who has some trouble in his assistance, for being your grateful reward.

I trust previously the manner of curing in the obstetric of America and Europe, but am sorry to say I could not get the same lady to believe before her approaching death because her kindred were many more who lead her according to their custom. Your present curing however was just now most wonderful in this palace.

I beg to remain your faithful well wisher,

S. P. P. M. MONGKUT,

The King of Siam.

But custom is omnipotent in the East, and it proved too much for even an absolutely despotic King to overcome. There is no reason to suppose this lady in her subsequent confinements dispensed with the broiling process. The queen herself, who the ensuing year gave birth to a prince, lay by the fire from choice, though suffering at the time with a grave disease which eventually caused her death.

In some few instances those in the employ of the missionaries and living on their premises, have been prevailed upon to dispense with this baptism of fire, but these same mothers in subsequent confinements when living among their own people yielded to the force of universal custom. Indeed, had they not conformed to it they could have secured no native attendance in the trying hour.

The missionary ladies at Petchaburi, startled by the sad fact of the death when but eight or nine days old, of three out of six or seven born in their immediate neighborhood, succeeded after long persuasion in inducing a married Christian woman to try their way when her next child was to be born. But she undertook it from a sense of Christian duty, in the spirit of a martyr. "It is a dark

road and full of fear" she said, "but I will trust in God. If he lets me die, all will be right, many women die also by the fire, but if I do not die I will always be glad that I set an example for Siamese women." All went on favorably in her case, to the astonishment of many in that region who visited her. They were very curious however, to learn what *medicine* she took to avert the great peril she incurred. Her room where she lay cool and comfortable on a mattress with a white sheet spread over her, her little one washed and dressed by her side, presented a striking contrast to the scenes ordinarily witnessed when children are born in Siamese homes.

It may be observed of this custom of "lying by the fire," that the origin of it can hardly be religious, for the Malays who are Mohammedan, are as observant of it as the Siamese who are all Buddhists, though as Sir John Bowring suggests, there may be some vague idea of pacification or purification connected with it.

Nor is the custom one imposed on women by the tyranny of the other and stronger sex, like the veiling of the face required in Mohammedan countries. It seems to be a *self-imposed* addition to what one would think was already a sufficient amount of suffering incident to motherhood, and only furnishes another proof that "the dark places of the earth are full of the habitations of cruelty."

It must be added, there is one compensation to offset the mischievous consequences of this practice. It makes the women of the land escape the evils, (prolapsus, etc.,) that result in other countries so often from resuming household duties too soon after the birth of a child. The Siamese mother is guaranteed by this custom for one month at least, the fullest liberty to rest by her own fire-side, undisturbed.

NEW BOOKS AND INSTRUMENTS.

A Guide to the Qualitative and Quantitative Analysis of the Urine, designed for physicians, chemists and pharmacists. By DR. C. NEUBAUER, Professor, chief of the Agricultural Chemical Laboratory, and Docent in the Chemical Laboratory in Wiesbaden, and DR. J. VOGEL, Professor of Medicine in the University of Halle, with a preface by PROF. DR. R. FRESENIUS. Translated from the seventh enlarged and revised German edition by ELDRIDGE G. CUTLER, M.D., assistant in Pathology in the Medical School of Harvard University. Revised by EDWARD S. WOOD, M.D., Professor of Chemistry in the Medical School of Harvard University, 8vo., pp. 551. William Wood & Co., New York, 1879.

The elegantly bound and printed volume of five hundred and fifty one pages, bearing the above rather formidable title page now lies before us. As an exhaustive treatise on urine it probably has no equal.

The first chapter of one hundred and ninety pages, by Neubauer, is really a physiological chemistry in itself, possessing extreme scientific accuracy, and as a result being at times rather technical.

The normal and abnormal ingredients of the urine are taken up in succession and treated under the heads: presence, preparation, microscopical properties, chemical properties and detection.

These descriptions and the whole work throughout, bear the evidences of most careful investigations with the powerful adjuncts of a perfectly appointed chemical laboratory, polariscope, spectroscope, microscope, etc.

The presence of carbohic acid as a normal constituent of human urine, may strike the reader as improbable, and the author himself doubts whether it may not be a result of chemical action in the process employed to detect it.

The means described to prove its presence are useful, however, in cases where it is a pathological ingredient after external or internal administration of the acid. In the paragraph on uroxanthin or indican, he considered it a normal ingredient of urine in small amount, increased in a variety of diseases but pathognomonic of none.

Among the abnormal ingredients the paragraphs on albumen, sugar and biliary substances, will probably prove most useful; while the description of the newly discovered substances, brenzcatechin, (Ebstein and Müller), acetone, (Rupstein), and the two new pathological coloring matters, uro-rubrohæmatin and uro-fuscohæmatin, (Baumstark), will be read probably from curiosity.

The next part on organized and non-organized sediments contains more which is practically useful to the physician. It will be found less thorough and showing less familiarity with the subject than the corresponding section in the latter part of the book by Vogel. For instance, the author speaks of spermatozoa as "spherical or nearly spherical elements, with a distinctly recognizable tail which is usually pointed," while the pear shape of the head of spermatozoa is well known.

The next paragraph on accidental constituents of the urine is a good guide to the detection of various substances, foods, medicines and poisons which are partly or wholly eliminated by the kidneys. Among these are salts of the heavy metals, alkalies, acids, alcohol, quinine, salicylic acid, etc. The second division explains, in as concise language as scientific accuracy will permit, the mode of quantitative estimation of individual substances, by the volumetric method.

It is here however, that the maze of chemical reaction and manipulation will confuse the reader, and the facts stowed therein will fail to reach the practitioner, their intended goal. To the chemist and pharmacist, for whom also this book is designed as a guide, the matter in this paragraph will prove more useful.

All modes of estimating urea are inferior in simplicity to Dr. Fowler's by the loss of specific gravity of the urine after decomposition by the solution of chlorinated soda, (Labaraque's solution).

The third division is a condensation and summary of what has gone before among other things, proving by experiment the exact-

ness of estimating the solid ingredients in the urine by multiplying the last three decimals of the specific gravity, carried out to four places of decimals, by 0.233. For example, in urine having the specific gravity 1.0275 he finds by the evaporation method, 64.2 parts per thousand of solid ingredients, while multiplying the 1.0275 by .233 he gets 64.07 parts per thousand.

It is in the second part, introduced on the three hundred and fifty seventh page by Dr. Julius Vogel, that medical men will enter a more congenial atmosphere, feel more at home and reap more practical benefit.

This part is termed by its author "The Semeiology of Human Urine, or the Estimation and Significance of the Changes of this Fluid, together with a guide to the Examination of Urinary Calculi and other Urinary Concretions, with especial References to the Purposes of the practising Physician."

It is throughout very practical, referring for the more complex details to the first part by Neubauer, thus demonstrating the unity of the work and avoiding needless repetition.

This part is replete throughout with clinical facts and carefully conducted experiments. The first chapter is on changes in color, appearance and odor of the urine which our unaided senses can determine, and which when understood are of great clinical importance.

In the next place speaking of the chemical reaction of the urine, especially the alkaline decomposition in the bladder, he lays down the very important rule, which cannot be too often repeated, that *every catheter must be most carefully cleaned before being used*.

A foot-note on page three hundred and seventy four by the Reviser is interesting. He quotes Maly, *Berichte der deutscher Chemischen Gesellschaft*, 1876, p. 164, as explaining, partially, the mode of origin of the acid urine from the alkaline blood.

He found by placing in a diffusion apparatus a mixture of the monosodic (acid) and disodic (alkaline) phosphates of sodium, that the acid phosphate passes through the membrane much more readily than the alkaline, so that while the fluid in the dialyser has an alkaline reaction, that without has an acid one.

The third chapter on abnormal constituents of the urine is very valuable, as he points out the cause, mode of detection, and importance of each, and makes some remarks on the diseases in which they are found, with the prognosis, etc.

Chapter IV, on urinary sediments, shows a more thorough knowledge of the morphological elements in the urine than the

corresponding chapter in the first part, and it contains many interesting clinical examples. The statement he makes, that the jelly-like sediment in the ammoniacal urine of cystitis, consists of pus corpuscles broken down and fused by the action of the alkali may strike some, who have always considered it mucus, as strange.

On page four hundred and twenty-eight he asserts the impossibility to distinguish between pus and mucus corpuscles, and declares their identity. He then makes differential diagnoses as to the point of origin of the pus found in urine, and cites a case.

Paragraph one hundred and fifteen describes cancerous and tuberculous masses found in the urine and their significance, and gives two interesting cases.

The next chapter on Quantitative Changes in the Urine, delineates the variations in the quantity of the urine and its separate constituents under different physiological conditions. This chapter is illustrated by thirty-five very instructive cases, and the results of many experiments.

He considers the great diminution in chlorine and sulphuric acid in all acute diseases due to the small amount of ingesta containing chlorine and sulphuric acid taken. In one acute disease he finds the chlorides increased however, *i. e.*, during the paroxysm of intermittent fever.

The closing chapter on urinary calculi is all-sufficient for its intended purpose.

The three plates of six figures each, (some from Dr. Funke's atlas), are very good, and the fourth plate of test colors and the spectra of hæmatin and hæmoglobin will be found useful.

The work is closed with a very complete index. To conclude, the book is admirable as a scientific production, pleasing in its American translation and handsome in its printing, illustration and binding.

[R. W. A.]

A Practical Treatise on Surgical Diagnosis. By AMBROSE L. RANNEY, A. M., M. D., Adjunct Professor of Anatomy, and Lecturer on Minor Surgery, in the Medical Department of the University of New York. New York, Wm. Wood & Co., pp. 375, 1879.

The author claims for this work no originality as to the facts set forth, but expressly states that if he succeeds "in placing before students and the medical profession at large a work whose system and arrangement will probably be its chief recommendation, the object of this volume will have been accomplished."

It is divided into eight parts : I. Diseases of the blood-vessels. II. Diseases of the joints. III. Diseases of bone. IV. Dislocations. V. Fractures. VI. Diseases of the male genital organs. VII. Diseases of the abdominal cavity. VIII. Diseases of tissues.

The arrangement is such that in each part all the diseases to be discussed are first enumerated in groups, and in succeeding pages the individual diseases particularly liable to be confounded are contrasted. The history and symptoms of two diseases are usually given on each page under appropriate headings ; so that by reading the column downwards we obtain all the information pertaining to each, while by reading across the two columns we get the points of difference as to history, location, development, size, frequency, age affected, etc., etc. When occasion seems to require, the symptoms in common, which may be liable to occasion errors in diagnosis, are grouped together at the bottom of the page. If, for example, we open at random at diseases of the testicle, we find thus contrasted acute orchitis and neuralgia of the testis ; syphilitic orchitis and tubercular orchitis ; malignant orchitis and syphilitic orchitis ; cysts of the testis and hydrocele ; benign fungus of testis and cancer of testicle with fungus ; orchitis and epididymitis ; hæmatocele and hydrocele ; while a double page contrasts syphilitic testis, malignant testis and sarcoma of testis with each other.

The type is large and clear, and the mechanical arrangement is such as to accomplish at a glance what the author has aimed at. Many minor points, and many not definitely agreed upon by reliable authors, are necessarily left out ; but we have not noticed any important omission, and the work taken as a whole shows a praiseworthy diligence on the part of the compiler.

It would be folly to expect such a volume to take the place of a good text-book on surgery. No student should allow it to take the place of systematic reading, for such a course would certainly lead to a lamentable superficiality ; while the practitioner might with advantage make use of it as a time-saving means of refreshing his memory in an emergency, though we doubt if he would even then find in it the same satisfaction as in a more minute and complete treatise.

[S. B. W.]

Spermatorrhœa : its Causes, Symptoms, Results and Treatment. By ROBERTS BARTHOLOW, M.D., etc. Fourth edition, revised. 8vo, pp. 128. Wm. Wood & Co., New York, 1879.

Upon the whole, this small volume gives a good account of spermatorrhœa. The various morbid conditions, mental and physical, which are usually included under this term are, we believe, deserving of much more extended consideration, but the fashion is now setting against bulky monographs. The brevity of the description in many places would seem to those not acquainted with the accomplished author to indicate a small experience, as the delicate shading of cases between extreme types is merely hinted at.

Some few points appear deserving of criticism. On pages twenty-one and thirty-four the author expresses contradictory opinions as to the appearance of spermatozoa in old cases of spermatorrhœa. The statement on page thirty-four, to the effect that the spermatic fluid contains small and inactive filaments is, perhaps, a remains of a former edition. In the symptomatology of spermatorrhœa and masturbation, not enough stress is laid upon vaso-motor disturbances, which, in our experience, are very common and important; easy flushing of the face, attacks of cerebral anæmia (often designated as "fulness" by patients), persistent coldness of the extremities with a bluish mottled skin, are extremely frequent. On page ninety-one Dr. Bartholow states that in his experience, Jews are not often afflicted with "seminal weakness." Our own experience has been quite the reverse, many of our cases of spermatorrhœa and of sexual hypochondriasis having been in the persons of Jews, who usually possess a condition which we are disposed to consider as causing or aggravating sexual hyperæsthesia, viz: a narrow meatus. The author, strange to say, does not refer to this factor, and consequently, in his judicious remarks upon treatment, says nothing of enlarging this aperture when narrow. In these cases, we believe incision of the meatus to be demanded by two indications: 1. To relieve a positive irritation depended upon the stenosis; 2. To enable the physician to pass steel sounds large enough to *fully* dilate the deep urethra; the number to bear a certain proportion to the size of the penis, as stated by Prof. Otis.

Dr. Bartholow devotes three pages to "Imaginary Spermatorrhœa," or sexual hypochondriasis, which in our opinion is very common, and deserving of much more emphasis. In the etiology of the disease, not enough is said, it seems to us, of the exceedingly common conjugal excesses and conjugal onanism, as causes of sexual hypochondriasis and of functional nervous affections; but, on the other hand, we gladly see that the author properly

condemns the indecent caresses which not rarely characterize courtship and flirtation, to the detriment of the health and moral sense of both parties. We have seen several cases of severe "spermatorrhœa" produced by prolonged sexual excitement without gratification in men long "engaged"

There is no separate chapter on prognosis, but the author's hopefulness appears in many places. We doubt the curability of well-marked cases of spermatorrhœa or masturbation. Even if the local or strictly sexual symptoms are overcome, the dwarfed intellect, enfeebled will, and over-conscious Ego remain. We agree with the author in considering the imaginary cases the most unmanageable. Take it all in all, the book is to be recommended, and must form a good basis for personal study of cases and more ample reading by those interested in the subject.

[E. C. S.]

Treatise on Dental Caries. Experimental and therapeutic investigations by Dr. E. MAGITOT. Translated by THOMAS H. CHANDLER, D.M.D. Boston; Houghton, Osgood & Co., 1878, pp. 275.

The author of this book is a French surgeon, prominent in his speciality, and well-known to the readers of the Paris medical journals, through his papers upon the development of the teeth. The book is, of course, written mainly for dental surgeons, but there are many pages in it which will interest and instruct even the non-professional reader. The first fifty pages treat of the anatomy of the teeth and the pathology of dental caries; the following hundred record the results of experiments instituted to determine the influence of various agents and conditions in the production of caries, and the remainder of the book is given up to symptomatology and treatment. The section which treats of the preventive treatment of caries, especially during the progress of, or convalescence from, acute febrile diseases, is of especial practical interest.

The book is very handsomely printed, and is adorned by several steel engravings printed from the original plates.

[L. A. S.]

- **Iconographie Photographique de la Salpêtrière, service de M. Charcot.** Par Bourneville et P. Regnard, t. ii, pp. 232, avec 39 planches. 1878.

This admirable work should be upon the book-shelves of every one interested in neurology, normal and morbid psychology. The most varied forms of convulsions, of postural representations of

delusions, of demoniac possession are indelibly recorded, and a very full, perhaps over-minute text, completes the study. Even in a religio-political sense, the volume has value as bearing upon cases like those of Louise Lateau, in Belgium, and other modern "miracles." The Salpêtrière has been a perfect mine of scientific wealth to Prof. Charcot and his pupils, foremost of whom is the editor of this *Iconographie*, Dr. Bourneville. [E. C. S.]

Wood's Library of Standard Medical Authors. Wm. Wood & Co., New York, 1879.

I. A Clinical Treatise on Diseases of the Liver, by Dr. FRIED. T. FRERICHS, in 3 vols. Vol. I, II and III, pp. 224, 228 and 246.

II. A Practical Manual of the Diseases of Children, with a Formulary. By EDWARD ELLIS, M.D., pp. 213.

III. On Rest and Pain. By JOHN HILTON, F.R.S., etc., pp. 299.

Messrs. William Wood & Co. will receive the thanks of many members of the profession, for this cheap edition of standard works. The "make-up" of the volumes is good, considering the subscription per annum, (twelve volumes for twelve dollars) and the student can profit as much by them as by the costly original editions. The works themselves are so well known that no criticism of them is called for. We would add our gratification at the selection of Hilton's admirable lectures, as one of the earliest volumes. [E. C. S.]

The following books have been received :

ESSAYS IN SURGICAL ANATOMY AND SURGERY. By John A. Wyeth, M.D. 8vo, pp. 262, with illustrations. New York, William Wood & Co., 1879.

CLINICAL LECTURES ON DISEASES PECULIAR TO WOMEN. By Lombe Athill, M.D. Fifth edition. 12mo, pp. — with numerous illustrations. Lindsay & Blakiston, Philadelphia, 1879.

And numerous Journals in exchange.

G. P. PUTNAM'S SONS announce that they have in preparation :

I. An American edition of THE ANATOMY OF THE NERVOUS CENTRES, by Prof. G. HUGUENIN, of Zurich. Translated by Dr. W. J. Morton.

II. THE NORMAL AND PATHOLOGICAL ANATOMY OF THE EVE, by A. ALT, M.D., of Toronto. This will be extensively illustrated, and a German edition will be issued simultaneously in Wiesbaden.

III. THE BRAIN, THE SPINAL CORD AND THE NERVES, by WM. A. HAMMOND, M.D.

ABSTRACTS AND SUMMARIES.

Laryngeal vertigo. Prof. CHARCOT describes anew this interesting affection. The symptoms consist in a tickling or sense of irritation, burning in larynx with cough, (laryngeal aura) followed by loss of consciousness, fall, spasmodic movements in face and limbs. Biting of the tongue, involuntary emission of urine have not been observed. The larynx was healthy in two cases in which the laryngoscope was used (Fauvel and Krishaber), but in a case published (1876) by Dr. Sommerbrodt, there existed a polypus of the larynx, whose removal put an end to the attacks. One of Charcot's cases was cured (?) by three week's treatment by bromide of potassium and blisters upon the neck near the larynx. The affection was first described and named by Dr. Gasquet, in the *Practitioner* for August, 1878.—*Le Progrès Médical*, 1879, No. 17.

[E. C. S.]

Treatment of infantile convulsions. In lectures delivered at the *Hôpital des Enfants Malades*, Dr. JULES SIMON has recently considered the important subject of infantile eclampsia at length, and his conclusions as to prognosis and treatment are as follows :

In general the prognosis of convulsions is not serious. Convulsions ushering in an acute disease are not dangerous, whereas those occurring at its close are nearly always fatal. Repetition of convulsions renders the prognosis more and more unfavorable. Until urine has been freely voided an attack of eclampsia cannot be considered as terminated.

As to treatment, Dr. Simon takes issue with the late Prof. Trosseau, who advises little or no treatment. Dr. Simon proceeds at once to an active treatment without attempting too fine a diagnosis. He first administers a purgative enema containing senna, 5 grams, and sulphate of sodium, 15 grams, or lacking these ingredients, he extemporizes a stimulating injection. Next, at the first subsidence of spasm, he empties the stomach by an emetic. If the attack continue he himself prepares and administers a hot mustard bath to the little patient. A sedative draught containing bromide of potassium, 2 grams, sy ups of codeia and of ether, cherry laurel water, etc., is to be given (to a child fifteen months old) in small quantities, as rapidly as the child will take it.—*Gazette Médicale*, Nos. 16, 17, 18, 1879.

[E. C. S.]

A new lesion of renal epithelia in the early stages of Bright's disease.

Prof. CORNIL has presented an interesting memoir on this subject to the French Academy of Sciences. In a first case of albuminuria, of only two months' standing, with great reduction in the amount of urine, and even anuria at times, fragments of the kidneys were hardened by osmic acid. The microscope showed that in most of the remaining convoluted tubules, the epithelial cells contained large vacuoles, each filled by ball or mass of albuminoid substance. The lumen of tubuli held numerous such masses or drops, and in places these products caused distension of the tubules. As a proof that these masses were derived from the epithelia, Cornil avers the fact that *empty* epithelia were also to be seen. He believes that hyaline and colloid casts are formed in the tubuli recti by the fusion of these masses; and he establishes an analogy between morbid secretion by renal epithelia, and the normal secretion of mucus by epithelia of the digestive tracts. The same lesion was found by the author in two other cases of Bright's disease, and in one case of cystic disease of the kidneys. The lesion may be seen in preparations made by means of Müller's fluid, but not as clearly as after hardening in osmic acid.—*Gazette Médicale*, No. 18, 1879.

[E. C. S.]

Administration of salicylic acid. Dr. WILLIAM SQUIRE recommends the use of a standard solution of salicylic acid in glycerine—3 ss. to $\bar{3}$ ss., (2 grams to 20 grams), or gr. v to 3 j (.30 grams to 5 grams). This can be diluted as desired with hot water, and

taken in regular usual doses, or sipped every little while. He recommends it highly in scarlatina anginosa, diphtheria, typhoid fever, diabetes (it is superior to salicylate of sodium), common catarrhal sore throat, whooping cough and hay fever. In the last two affections, the solution reduced to gr. i to $\frac{3}{4}$ j of water, (.05 to 30 grams) may be used by spray. Dr. Squire, in administering salicylic acid, expects to obtain germicide as well as antipyretic effects. *British Medical Journal*, April, 26, 1879.

[E. C. S.]

Traumatic rupture of the internal parts of the heart.

From the study of a number of cases of contusion of the præcordial regions and of penetrating wounds, Dr. Terrillon concludes that these injuries may cause:

1st. Lacerations of the cardiac walls as described by classic authors. 2d. Contusions and ecchymoses of the cardiac walls, which have not much influence upon the heart's action. 3d. An internal rupture, affecting a valve, a septum, the columnæ carnæ, or the chordæ tendinæ. If the injury be done while the heart is in diastole, rupture of the internal parts alone occurs, produced by compression of the blood within the ventricle. If the force act upon the contracted cardiac muscle (systole) a rupture of the parietes is more probable. The importance of intra-cardiac rupture through injuries is great in a medico-legal sense, and for prognosis.—*Le Progrès Médical*, Nos. 13 and 14, 1879.

[E. C. S.]

Nerve-stretching in tetanus. DR. THOMAS, of Tours, reports a case in which the symptoms of tetanus were relieved immediately by nerve-stretching, although the patient died a few hours afterwards. The patient, a man 28 years old, wounded the ball of his left thumb deeply by a fall upon broken glass. The wound did well, and the patient returned to work. Three weeks after the accident cramps were felt in the wounded hand and corresponding arm; the next day the cramps were more severe; the third day the jaws became stiff, and on the fifth day he entered the hospital in the following condition: marked opisthotonus, with such rigidity that the patient could be raised by the neck or heels; impossibility of separating the jaws for a greater distance than half a centimetre between the incisors; difficulty in swallowing; every four or five minutes very painful convulsions, excited by the least effort or the lightest touch of the wound. The slighter spasms involved only the injured hand and

corresponding arm; the more severe ones involved both arms, and the opisthotonus and trismus were increased during the attack; profuse perspiration, dry tongue, pulse 120, temperature 39° . On the left thenar eminence was a wound three or four centimetres long, filled with healthy granulations, but not suppurating. Intelligence was complete, and the patient declared that no foreign body remained in the wound, which at the time of the accident was large and gaping; he also said that he had not been exposed to cold, and that he was not intemperate. The treatment ordered was hypodermic injections of morphine in the neighborhood of the wound every four or five hours, and a potion containing eight grams of chloral hydrate, to be taken in the course of the twenty-four hours.

The next (6th) day the patient being no better, pulse 120, temperature 40° , elongation of the median nerve was determined upon, and practiced in the lower third of the arm, with the aid of Esmarch's band and local anæsthesia; the nerve was exposed for a distance of three centimetres, raised upon a grooved director and twice compressed firmly against it.

Several spasms occurred during the operation, and two slight ones followed it. An hour later the patient fell asleep, and rested quietly for two hours. On waking he had a very slight spasm, the last, moved his legs easily, drank without difficulty, and said he felt very well. At 5 P. M. the pulse was 140, and very small; temperature in the axilla 41° . At 7 P. M. delirium; 10 o'clock coma; 11 o'clock death.

The autopsy showed that there was no foreign body in the wound, and that the internal collateral nerve of the thumb, which was in contact with the deeper part of the wound, was indurated, yellowish, and adherent to the cicatrix. The median nerve, which was normal in the forearm, was deeply congested, flattened and soft with rupture of the peripheral and conservation of the central fibres, at the point where it had been stretched.

The lower lobes of the lungs were intensely congested; the liver showed in its convex surface pale, anæmic spots, due to the crowding of the capillaries with leucocytes. No pus in the joints or axillary glands, but three small subcutaneous abscesses in the left forearm. In the title of the note the death is attributed to purulent infection or pyæmia, but neither the autopsy nor the clinical history seems to warrant this view. Possibly if the operation had been performed two or three days earlier the result might have been different.—*Bulletin de la Société de Chirurgie*, 1879, p.

The treatment of dental periostitis by resection of the root and replacement of the tooth.

M. MAGITOT, so well known in connection with the late Charles Legros for his experimental investigations of the mode of growth of the teeth, has just made an important contribution to the therapeutics of periostitis about the roots of the teeth, an affection which is often brought to the notice of surgeons by the formation of neighboring abscesses and fistulæ. In 1820 Delabarre, a French surgeon, drew a tooth which was the cause of a fistula, cut off a portion of its root, and replaced it successfully. A similar operation was done in 1853 at Montpellier, and in 1870, Messrs. Coleman and Lyons, of St. Bartholomew's Hospital, London, published fourteen cases treated in this manner, with nine successes. Since that time a number of French surgeons have performed the operation, and in 1878 Dr. David collected and published twenty new cases with only one failure. Magitot, performing it first in 1875, has now done it sixty-three times, with five failures.

The diagnosis is easily made, for it is usually indicated by distinctive and well-marked lesions, such as inflammation or abscess on the alveolar border or the face, denudation and partial necrosis of the maxilla, and fistula upon the mucous or cutaneous surface. The local pathological condition is periostitis and caries at the apex of the root of a tooth, with destruction of the bulb and its vascular connections. The therapeutical indication is the removal of the diseased portion of the tooth. Occasionally it has been possible to do this by introducing a pair of Liston forceps through a large alveolar fistula and cutting off the affected portion of the tooth, but the cases in which this can be done are very rare.

M. Magitot recommends the following procedure : (1.) Careful removal of the tooth without bruising the gum and without lateral motions which might splinter the alveolar wall. (2.) Resection with cutting pliers of the affected portion of the root, and filing of the edges. If the crown is also diseased, it must be scraped or filled in the usual manner, the root being kept enveloped in a cloth wet with warm water. The socket is then examined, splinters removed, and a fistula made (if one does not exist) by drilling through the alveolar wall. (3.) As soon as the bleeding has ceased, the tooth is replaced in its socket, and fastened there by a figure-of-eight bandage or a gutta-percha shield. The fistula must be kept open for a few days by a drainage tube or by frequent probing. The local reaction is slight, new adhesions are

formed in a few hours, and complete recovery with closure of the fistula usually takes place in less than a fortnight.

This treatment is usually unsuccessful in those cases in which the pus has made its way to the surface alongside the tooth, the failure seeming to be due to the alteration or destruction of the periosteum in the line of the fistula, and the consequent diminution of the surface by which the new adhesions must be formed. The ages of M. Magitot's patients ranged from 16 to 55 years, and in about three-fourths of the cases he filled cavities in the teeth before replacing them.—*Bull. de la Société de Chirurgie*, 29th January, 1879. [L. A. S.]

Fatty degeneration of the cardiac muscle after section of the nervi vagi.

In more than thirty experiments upon birds (and others upon mammals), H. Eichhorst has found that section of the vagi is followed by rapid fatty degeneration of the cardiac muscle, and that death is caused by failure of the heart's action. Eliminating several sources of error (inanition, etc.) Eichhorst concludes that some fibres of the pneumogastric have a direct trophic influence upon the muscular tissue of the heart. This discovery may in the future help to throw light upon the pathology of fatty degeneration of the heart in man.—*Centralblatt f. die med., Wissenschaften*, No. 10, 1879, p. 181 and p. 161. [E. C. S.]

Location of the "centres for sweating;" and diaphoretic agents.

By means of simple, yet satisfactory experiments, NAWROCKI has recently determined the location of the chief "sweat centre" to be in the medulla oblongata. Two experiments may serve as types. (1) A sweating cat is curarised, its left sciatic cut and one of the true diaphoretics introduced under the skin: in a few minutes copious respiration appears upon all the three normal extremities, while the left foot remains dry. (2) In a curarised sweating cat, the spinal cord is cut across transversely below the medulla, artificial respiration is kept up, and a diaphoretic introduced by the syringe: no perspiration appears on the extremities.

According to the author (also Ott and Field) muscarin and pilocarpine cause sweating by acting on a peripheral nervous apparatus; whereas picrotoxin, nicotin, physostigmin and acetate of ammonium produce diaphoresis by acting on the "sweat centre" in the medulla oblongata. [Many physicians will be glad to learn that modern experimental physiology justifies the claims of Spiritus Menerdiri to diaphoretic power.]—*Centralblatt f. die med. Wissenschaften*, No. 15, 1879. [E. C. S.]

ORIGINAL OBSERVATIONS.

CASE OF DESQUAMATION OF THE KIDNEYS DURING THE ADMINISTRATION OF MERCURY AND IODIDE OF POTASSIUM.

By E. C. SEGUIN, M. D.

A youth of 19 was under my care during the last half year for symptoms of cerebellar tumor : viz., epileptiform attacks, occipital headache, partial opisthotonus, moderate neuro-retinitis, partial right hemiplegia, ending in death. The urine was examined in the autumn and found normal. In December, 1878, the occipital pain and spasm became very severe, partial right hemiplegia showed itself, and the patient was given the red iodide of mercury, .01 gram and iodide of potassium, 2 grams four times a day ; blisters were applied behind the ears. Improvement showed itself early in February, and about that time the urine was examined because of its great quantity. What was my surprise at finding in it an enormous number of hyaline and epithelial casts. There was no albumen and the patient had no other symptom of renal disease. From February 13th to March 7th, numerous examinations were made, with the following results : urine of good color, specific gravity varying from 1,018 to 1,020, absolutely free from albumen, depositing innumerable casts of all sizes, hyaline and epithelial. In some instances eight or ten casts were counted in a field. Prof. A. L. Loomis examined two slides containing these casts. At Dr. Loomis' suggestion the medicines were stopped February 17th. Until February 24th, casts were still detected in diminishing number, hyaline casts being the last observed. The iodine reaction also persisted for at least a week after the stoppage of the iodide. On March 7th, it is noted that no casts are to be found, and this negative result was obtained on several other days.

About March 24th, after a remarkable remission of two weeks, (walking about the house), the epileptiform attacks, opisthotonus, and severe occipital pain recurred, and the mixed treatment was once more begun. The amount of mercury and iodide of potassium given in this relapse was about the same as before, (.01 gram and 2 grams four times a day), with extra doses of iodide alone afterwards. On some days the patient took nearly 15 grams. On April 9th, the urine had a specific gravity of 1.018, contained 1 per cent. albumen, and an immense number of hyaline and epithelial casts; also free renal epithelium. As before there were no symptoms of renal disease. Several other examinations were made previous to death on April 18th, with the same result as regards casts. The last two days were characterized by a steadily rising temperature up to 41.26°C. , (106.25°F.).

The symptoms in life, and the mode of death indicated organic cerebral disease, whether a chronic basal meningitis or a cerebellar tumor we were unable to decide, as a post mortem examination was refused.

The most interesting point in the case was the occurrence of severe renal desquamation on two occasions, apparently caused by iodide of potassium, or by it and mercury combined. That a few hyaline casts may appear in the urine of patients taking iodide is generally known, but the shedding of enormous quantities of epithelium was startling. It should be remembered that the first desquamation ceased about one week after the iodide was stopped, and that the iodine color and the casts disappeared about the same time.

My friend Dr. F. P. Kinnicutt, communicates another case which occurred in his practice. I quote the doctor's notes: "The patient was taking .003 gram of biniodide of mercury and .75 gram of iodide of potassium three times a day for secondary syphilis. On March 23, 1877, he contracted an urethritis. Examination of the urine showed numerous leucocytes and hyaline casts. The latter were of varying size, but all of similar character. There was a mere trace of albumen easily accounted for by the number of pus corpuscles. With the complete cessation of the urethritis (in three weeks), the trace of albumen disappeared, not to return. Hyaline casts, however, continued to be found in great numbers. On May 20th, the casts were still present in the same numbers. The iodide of potassium was discontinued, but the mercury was not omitted. Within a week after the discontinuance of the iodide, the casts were fewer in numbers, and early in July had notably

diminished. Patient went into the country at this date ; on his return in November a careful examination of the urine failed to show a single cast. [Mr. B. had been under my observation previous to his having contracted specific disease ; his urine had been examined and found healthy. During the period that casts were formed, the patient's general condition was excellent in all respects. The urine has been examined from time to time up to this time, and at no time have any casts been found. The iodide of potassium was never resumed.]

It would seem from these two cases, (to which I might add a third now under observation), that iodide of potassium may give rise to the formation of hyaline and epithelial casts, without albuminuria or rational symptoms of Bright's disease.

“ FOLIE À DEUX.”

AN INSTANCE OF APPARENT CONTAGION OF INSANITY
(MELANCHOLIA).

By E. C. SEGUIN, M.D.

K. L., aged 28, a single woman, seen in consultation with Dr. A. Jacobi, May 19th, 187—. There is a complex history of nervousness, hypochondriasis, and approach to hysteria in the last two years. Lately well-marked hypochondriacal melancholia, with constant talk of disease of the brain, extraordinary symptoms, etc. Patient has the facies and manner of a hypochondriac. Inquiry has revealed the important fact that for some time patient has practised self-abuse, and has endured great self-reproach in consequence. Seen again on June 3d. Is in full acute melancholia, refusing food, attempting suicide, not sleeping, growing weaker. Sent to Asylum.

P. L., a sister of the preceding patient, aged 25 years, was seen on June 12th. During the illness of K. L. she had become nervous and depressed, and was removed from home to some friends.' But she there grew worse, and at the time of K.'s commitment (June 3) she was decidedly melancholic ; reproaching herself for having caused her sister's ruin, declaring that she was not fit to live, etc. It appears that these two young women had slept and masturbated together. When seen June 12, fully developed acute melancholia is observed ; is worse than her sister. Sent to the Asylum.

The mother of the patients had once been insane.

It is interesting to add that both these patients recovered within eight months, and are now well.

These two cases well illustrate the ætiology of *folie à deux*, or contagious insanity, as explained recently by Falret and Lasègue in an important memoir.* It is not the exhibition of the insanity of the first party which causes the insanity of the second party; in other words there is not a true contagion. Both parties must be predisposed to alienation, must live in the same moral atmosphere, be exposed to the same exciting causes, and experience similar or corresponding emotions and conceptions.

These conditions of apparent contagion or nearly simultaneous development were found in all of Lasègue's and Falret's cases, and they are well exemplified in ours. Both the patients were children of an insane parent, both had enjoyed certain emotions and committed physical excesses together, both felt acute remorse for the vicious indulgence, and the second suffered in addition moral torture from the notion that she was responsible for her sister's illness.

TRAUMATIC PEDAL NEURALGIA OF ONE YEAR'S STANDING RAPIDLY CURED BY THE ACTUAL PLATINUM CAUTERY.

By E. C. SEGUIN, M.D.

Dr. K——g, aged 50, seen December 25, 1877. Is a man of good constitution; never subject to neuralgia. A little over two years ago one wheel of his wagon passed over the end of his right great toe, producing a moderate bruise but no fracture, luxation, or cut. In a few days he was perfectly well. In the last twelve months has suffered from gradually increasing pain in the toe which was injured, and along the inner side of the sole of the foot as far back as the ankle. The pain is burning, pressing, aching, not lancinating. It is worse in the day-time, and is aggravated by using the foot. No numbness or anæsthesia has been observed, but, on the contrary, there has been great hyperalgesia of the affected region, with some tumefaction and great hyperæmia. No pain above ankle; but patient has "fancied" that he had slight "sympathetic" pains in the left great toe and in the pulp of the

* La folie à deux, or folie communiquée. *Annales Médico-Psychologiques*, Nov., 1877, p. 321.

right thumb, when the pedal neuralgia was greatest. No head symptoms; no signs of paraplegia; bladder normal. No gout. Has been confined to the house for four and a half months.

Examination.—Right great toe and inner half of foot tumefied and red; the veins are large and there is much capillary stasis. No nodosities or other lesion exist about the affected toe. No true neuralgic tender point can be discovered, but some time before Dr. K. discovered one beneath the internal malleolus, near the sole. The whole right toe is very tender, and the chief pain is experienced along the internal aspect of the toe to its point.

The left great toe is rather reddish but not tender. When patient stands the passive congestion becomes enormous, and extends almost up to the groin. Repeated measurements by Dr. K. and myself show that the right foot (back of toes) is $.5^{\circ}$ C. hotter than the same part of the left.

The doctor bears the facial expression, and has all the attitudes of one who has suffered greatly from neuralgia. He has tried nearly all remedies and applications without relief.

Diagnosis. Traumatic neuritis of branches (and trunk?) of the internal plantar nerve.

I employed the actual platinum cautery applied over the posterior tibial nerve behind the malleolus, and on the seat of pain; no medicine was given. The first application gave relief; after the third burning Dr. K. was able to walk, and after the sixth the neuralgia disappeared; these cauterizations were made at intervals of two days. The great hyperæmia of the lower extremity continued. Dr. K. resumed his practice.

Early in May, 1878, a slight relapse occurred, which was completely cured by two or three applications. Since that time there has been no return of neuralgia, though the toes are the seat of slight semi-painful or cramp-like sensations. The hyperæmia had almost disappeared by autumn. In the past year the patient has not lost one day from neuralgia.

